CFR 47 FCC PART 15 SUBPART C
ISED RSS-247 ISSUE 2

CERTIFICATION TEST REPORT

For

Notebook Computer

MODEL NUMBER: Lenovo IdeaPad S540-13ARE, Lenovo IdeaPad S540-13API

FCC ID: O57IPS540A13
IC: 10407A-IPS540A13

REPORT NUMBER: 4789547060-6

ISSUE DATE: July 31, 2020

Prepared for

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Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone, 200131, CHINA

Prepared by

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The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products. This report does not imply that the product(s) has met the criteria for certification.

Revision History

Rev.	Issue Date	Revisions	Revised By
V0	07/31/2020	Initial Issue	

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Summary of Test Results			
Clause	**Test Items**	**FCC/ISED Rules**	**Test Results**
1	6dB Bandwidth and 99% Occupied Bandwidth	FCC Part 15.247 (a) (2) RSS-247 Clause 5.2 (a) ISED RSS-Gen Clause 6.7	Pass
2	Peak Conducted Output Power	FCC Part 15.247 (b) (3) RSS-247 Clause 5.4 (d)	Pass
3	Power Spectral Density	FCC Part 15.247 (e) RSS-247 Clause 5.2 (b)	Pass
4	Conducted Bandedge and Spurious Emission	FCC Part 15.247 (d) RSS-247 Clause 5.5	Pass
5	Radiated Bandedge and Spurious Emission	FCC Part 15.247 (d) FCC Part 15.209 FCC Part 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9	Pass
6	Conducted Emission Test for AC Power Port	FCC Part 15.207 RSS-GEN Clause 8.8	Pass
7	Antenna Requirement	FCC Part 15.203 RSS-GEN Clause 6.8	Pass

Note:
1.This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART C >< ISED RSS-247 > when <Accuracy Method> decision rule is applied.

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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Lenovo(Shanghai) Electronics Technology Co., Ltd.
Address:	Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone, 200131, CHINA

Manufacturer Information

Company Name:	Lenovo(Shanghai) Electronics Technology Co., Ltd.
Address:	Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone, 200131, CHINA

EUT Information

EUT Name:	Notebook Computer
Model:	Lenovo IdeaPad S540-13ARE, Lenovo IdeaPad S540-13API
Brand:	Lenovo
Serial Model:	Please refer to clause 5.1. Description of EUT
Sample Received Date:	June 15, 2020
Sample Status:	Normal
Date of Tested:	July 3, 2020 ~ July 29, 2020

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 FCC PART 15 SUBPART C	PASS
ISED RSS-247 Issue 2	PASS
ISED RSS-GEN Issue 5	PASS

Prepared By:

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Approved By:

Stephen Guo

Laboratory Manager

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 2 and ISED RSS-GEN Issue 5.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	**A2LA (Certificate No.: 4102.01)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation No.: CN1187)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules **ISED (Company No.: 21320)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320. **VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B , the VCCI registration No. is C-20012 and T-20011

Note 1: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

Note 2: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

Note 3: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30MHz had been correlated to measurements performed on an OFS.

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4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognize national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
AC Power Port Conduction emission	3.62 dB
Radiated Emission (Included Fundamental Emission) (9 kHz ~ 30 MHz)	2.2 dB
Radiated Emission (Included Fundamental Emission) (30 MHz ~ 1 GHz)	4.00 dB
Radiated Emission (Included Fundamental Emission) (1 GHz to 26 GHz)	5.78 dB (1 GHz ~ 18 GHz)
	5.23 dB (18 GHz ~ 26 GHz)
DTS Bandwidth and 99% Occupied Bandwidth	±0.0196 %
Conducted Output Power	±0.686 dB
Conducted Power Spectral Density	±0.743 dB
Conducted Band Edge Measurements	±1.328 dB
Conducted Spurious Emissions	±0.746 dB (9 kHz ~ 1 GHz) ±1.328 dB (1 GHz ~ 26 GHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name	Notebook Computer	
Model	Lenovo IdeaPad S540-13ARE	
Series Model	Lenovo IdeaPad S540-13API	
Model Difference	Lenovo IdeaPad S540-13API have the same technical construction including circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction with Lenovo IdeaPad S540-13ARE. The difference lies only on the difference AMD platform's CPU and model name. all these changes do not degrade the RF performance of the certified product.	
Technology	*Bluetooth* - Low Energy	
Transmit Frequency Range	2402 MHz ~ 2480 MHz	
Modulation	GFSK	
Data Rate	LE	1 Mbps
	LE 2M	2 Mbps
Battery	DC 11.55 V/4680 mAh/54 Wh	
FVIN	V1.0	
PMN	Lenovo IdeaPad S540-13ARE, Lenovo IdeaPad S540-13API	
HVIN	Lenovo IdeaPad S540-13ARE, Lenovo IdeaPad S540-13API	
EUT Serial Number	1385599200003	

5.2. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	11	2424	22	2446	33	2468
1	2404	12	2426	23	2448	34	2470
2	2406	13	2428	24	2450	35	2472
3	2408	14	2430	25	2452	36	2474
4	2410	15	2432	26	2454	37	2476
5	2412	16	2434	27	2456	38	2478
6	2414	17	2436	28	2458	39	2480
7	2416	18	2438	29	2460	/	/
8	2418	19	2440	30	2462	/	/
9	2420	20	2442	31	2464	/	/
10	2422	21	2444	32	2468	/	/

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5.3. MAXIMUM OUTPUT POWER

Bluetooth Mode	Frequency (MHz)	Channel Number	Maximum AVG Output Power (dBm)	Maximum AVG EIRP (dBm)
LE	2402 ~ 2480	0-39[40]	7.42	9.79
LE 2M	2402 ~ 2480	0-39[40]	6.37	8.74

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
LE	CH 0(Low Channel), CH 19(MID Channel), CH 39(High Channel)	240 2MHz, 2440 MHz, 2480 MHz
LE 2M	CH 0(Low Channel), CH 19(MID Channel), CH 39(High Channel)	240 2MHz, 2440 MHz, 2480 MHz

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2402 ~ 2480MHz Band				
Test Software Version		DRTU, Version 11.1941.0-10270		
Modulation Type	Transmit Antenna Number	Test Software Setting Value		
		CH 0	CH 19	CH 39
LE	1	16	16	16
LE 2M	1	16	16	16

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5.6. DESCRIPTION OF AVAILABLE ANTENNAS

SPEEDWIRE(SPD) Antenna

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
Tx1	2402 ~ 2480 MHz	PIFA	-0.12
Tx2	2402 ~2 480 MHz	PIFA	2.37

Test Mode	Transmit and Receive Mode	Description
GFSK	1TX, 1RX	Chain 1 and chain 2 can be used as transmitting/receiving antenna.

ICT Antenna

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
Tx1	2402 ~ 2480 MHz	PIFA	0.73
Tx2	2402 ~2 480 MHz	PIFA	-1.68

Test Mode	Transmit and Receive Mode	Description
GFSK	1TX, 1RX	Chain 1 and chain 2 can be used as transmitting/receiving antenna.

Note 1: The EUT have two kinds of antennas, one is called SPEEDWIRE antenna and the other one called ICT antenna.

Note 2: The EUT has two antennas, one is Tx1 which is the main antenna and the other one is Tx2 which is the auxiliary (AUX) antenna.

Note 3: BLE does not support MIMO mode, only 1 antenna active at any moment in time, all the antennas had been tested, but only the worst data was recorded in the report.

Note 4: The value of the antenna gain was declared by customer.

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5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	/	/	/	/

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	DC Input	Type C	/	/	/
2	USB	USB	/	/	/
3	Type C	Type C	/	/	/
4	AUX	AUX	/	/	/

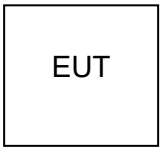
ACCESSORIES

Item	Accessory	Brand Name	Model Name	Description
1	AC ADAPTER	Lenovo	ADLX95YCC3A	Input: AC 100 ~ 240 V/1.6 A/50 ~ 60 Hz Output: DC 20 V, 4.75 A/ DC 15 V, 3 A/DC 5 V, 3 A

TEST SETUP

The EUT can work in engineering mode with a software through a Laptop.

SETUP DIAGRAM FOR TESTS



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6. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions						
Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	EMI Test Receiver	R&S	ESR3	101961	Dec.05,2019	Dec.05,2020
☑	Two-Line V-Network	R&S	ENV216	101983	Dec.05,2019	Dec.05,2020

Software				
Used	Description	Manufacturer	Name	Version
☑	Test Software for Conducted disturbance	Farad	EZ-EMC	Ver. UL-3A1

Radiated Emissions						
Instrument						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Dec.06,2019	Dec.06,2020
☑	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Sep.17, 2018	Sep.17, 2021
☑	Preamplifier	HP	8447D	2944A09099	Dec.05,2019	Dec.05,2020
☑	EMI Measurement Receiver	R&S	ESR26	101377	Dec.05,2019	Dec.05,2020
☑	Horn Antenna	TDK	HRN-0118	130939	Sep.17, 2018	Sep.17, 2021
☑	High Gain Horn Antenna	Schwarzbeck	BBHA-9170	691	Aug.11, 2018	Aug.11, 2021
☑	Preamplifier	TDK	PA-02-0118	TRS-305-00066	Dec.05,2019	Dec.05,2020
☑	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec.05,2019	Dec.05,2020
☑	Loop antenna	Schwarzbeck	1519B	00008	Jan.07, 2019	Jan.07, 2022
☑	Preamplifier	TDK	PA-02-001-3000	TRS-302-00050	Dec.5, 2019	Dec.5, 2020
☑	Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4	Dec.05,2019	Dec.05,2020
☑	High Pass Filter	Wi	WHKX10-2700-3000-18000-40SS	23	Dec.05,2019	Dec.05,2020
☑	Cable	/	/	9879/44EA	Dec.05,2019	Dec.05,2020
☑	Cable	/	/	20160201001	Dec.05,2019	Dec.05,2020

Software				
Used	Description	Manufacturer	Name	Version
☑	Test Software for Radiated disturbance	Farad	EZ-EMC	Ver. UL-3A1

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Other instruments						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
☑	Spectrum Analyzer	Keysight	N9030A	MY55410512	Dec.06,2019	Dec.06,2020
☑	Spectrum Analyzer	Keysight	N9020A	MY49100060	Dec.06,2019	Dec.06,2020
☑	Power Meter	Keysight	N1911A	MY55416024	Dec.06,2019	Dec.06,2020
☑	Power Sensor	Keysight	U2021XA	MY5100022	Dec.06,2019	Dec.06,2020
☑	Attenuator	Weinschel	3M-10	T9692	Dec.06,2019	Dec.06,2020
☑	Cable	R&S	/	MY11565/4PE	Dec.06,2019	Dec.06,2020
☑	Cable	R&S	/	MY11566/4PE	Dec.06,2019	Dec.06,2020

Software				
Used	Description	Manufacturer	Name	Version
☑	Test Software for RF Conducted Test	Tonscend	JS1120-3 RF Test System	2.6.77.0518

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7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

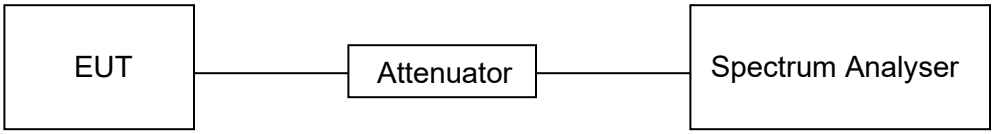
LIMITS

None; for reporting purposes only.

PROCEDURE

Refer to ANSI C63.10-2013 clause 11.6 Zero – Span Spectrum Analyzer method.

TEST SETUP



TEST ENVIRONMENT

Temperature	25.2 °C	Relative Humidity	59.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 11.55 V

RESULTS

Please refer to appendix G.

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7.2. 6 dB DTS BANDWIDTH AND 99% OCCUPIED BANDWIDTH

LIMITS

CFR 47FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(a)(2) ISED RSS-247 5.2 (a)	6 dB Bandwidth	≥ 500 kHz	2400-2483.5
ISED RSS-Gen Clause 6.7	99 % Occupied Bandwidth	None; for reporting purposes only.	2400-2483.5

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.8 for DTS bandwidth and clause 6.9 for Occupied Bandwidth.

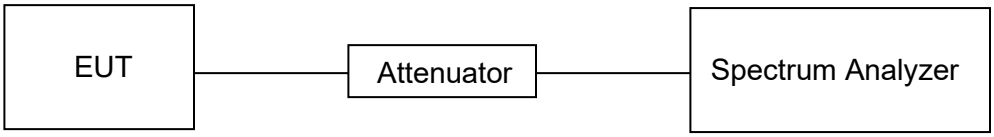
Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Frequency Span	Between 1.5 times and 5.0 times the OBW
Detector	Peak
RBW	For 6 dB Bandwidth: 100 kHz For 99 % Occupied Bandwidth: 1 % to 5 % of the occupied bandwidth
VBW	For 6 dB Bandwidth: ≥3 × RBW For 99 % Occupied Bandwidth: ≥3 × RBW
Trace	Max hold
Sweep	Auto couple

a) Use the 99% power bandwidth function of the instrument, allow the trace to stabilize and report the measured bandwidth.

b) Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



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TEST ENVIRONMENT

Temperature	25.2 °C	Relative Humidity	59.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 11.55 V

RESULTS

Please refer to appendix A & B.

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7.3. CONDUCTED OUTPUT POWER

LIMITS

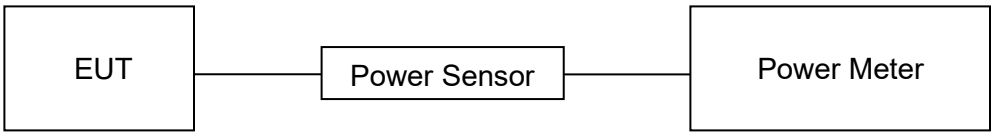
CFR 47 FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247(b)(3) ISED RSS-247 Clause 5.4 (d)	Peak Conducted Output Power	1 watt or 30 dBm	2400-2483.5
ISED RSS-247 Clause 5.4 (d)	Equivalent Isotropically Radiated Power	4 watt or 36 dBm	2400-2483.5

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.9.

Connect the EUT to a low loss RF cable from the antenna port to the power sensor (video bandwidth is greater than the occupied bandwidth).
Measure peak/average emission level, the indicated level is the peak/average output power, after any corrections for external attenuators, cables and duty cycle correction factor if need.

TEST SETUP



TEST ENVIRONMENT

Temperature	25.2 °C	Relative Humidity	59.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 11.55 V

RESULTS

Please refer to appendix C.

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7.4. POWER SPECTRAL DENSITY

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC §15.247 (e) ISED RSS-247 5.2 (b)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5

TEST PROCEDURE

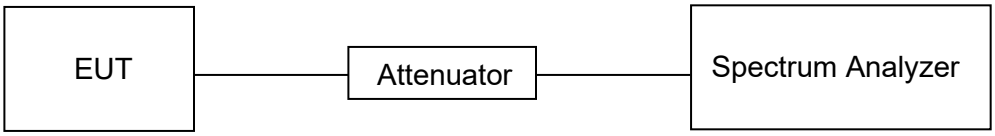
Refer to ANSI C63.10-2013 clause 11.10.

Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	3 kHz ≤ RBW ≤ 100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST SETUP



TEST ENVIRONMENT

Temperature	25.2 °C	Relative Humidity	59.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 11.55 V

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RESULTS

Please refer to appendix D.

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7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

CFR 47 FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 2		
Section	Test Item	Limit
CFR 47 FCC §15.247 (d) ISED RSS-247 5.5	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.11 and 11.13.

Connect the EUT to the spectrum analyser and use the following settings for reference level measurement:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	≥3 × RBW
Span	≥1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level.

Change the settings for emission level measurement:

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100 kHz
VBW	≥3 × RBW
measurement points	≥span/RBW
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11.

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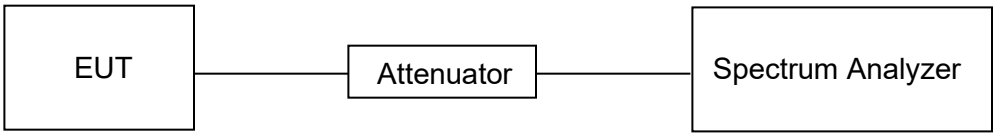
TEST SETUP



TEST ENVIRONMENT

Temperature	25.2 °C	Relative Humidity	59.9 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 11.55 V

RESULTS

Please refer to appendix E & F.

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8. RADIATED TEST RESULTS

LIMITS

Please refer to CFR 47 FCC §15.205 and §15.209.

Please refer to ISED RSS-GEN Clause 8.9 and Clause 8.10.

Radiation Disturbance Test Limit for FCC (Class B) (9 kHz-1 GHz)

Emissions radiated outside of the specified frequency bands above 30 MHz			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m	
		Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

FCC Emissions radiated outside of the specified frequency bands below 30 MHz		
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

ISED General field strength limits at frequencies below 30 MHz

Table 6 – General field strength limits at frequencies below 30 MHz		
Frequency	**Magnetic field strength (H-Field) (µA/m)**	**Measurement distance (m)**
9 - 490 kHz[Note 1]	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

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ISED Restricted bands please refer to ISED RSS-GEN Clause 8.10

Table 7 – Restricted frequency bands[Note 1]		
MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 – 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 – 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 – 8500	
108 – 138		

Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

FCC Restricted bands of operation refer to FCC §15.205 (a):

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6c

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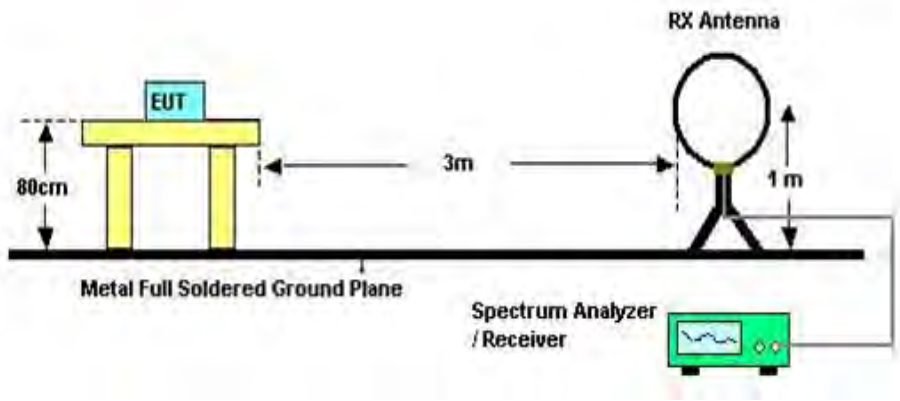
TEST SETUP AND PROCEDURE

Below 30 MHz



The setting of the spectrum analyser

RBW	200Hz (From 9 kHz to 0.15 MHz)/ 9kHz (From 0.15 MHz to 30 MHz)
VBW	200Hz (From 9 kHz to 0.15 MHz)/ 9kHz (From 0.15 MHz to 30 MHz)
Sweep	Auto
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 11.11.

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

6. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak and average detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak and average detector and reported.

7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.

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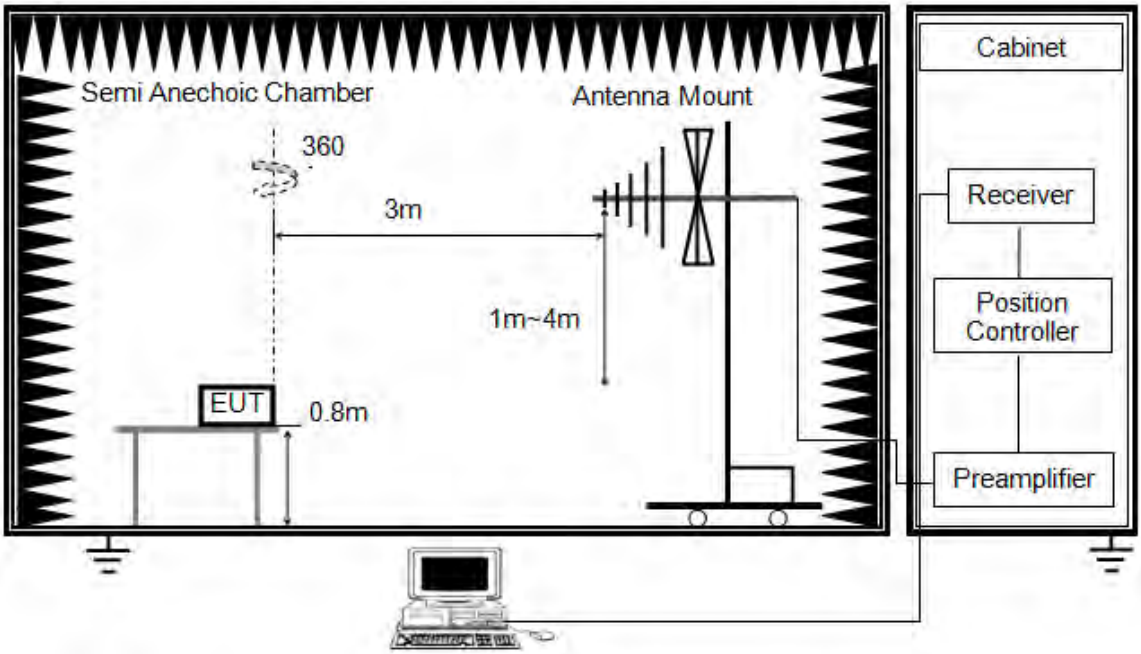
Below 1 GHz and above 30 MHz



The setting of the spectrum analyser

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 11.11.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1 GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

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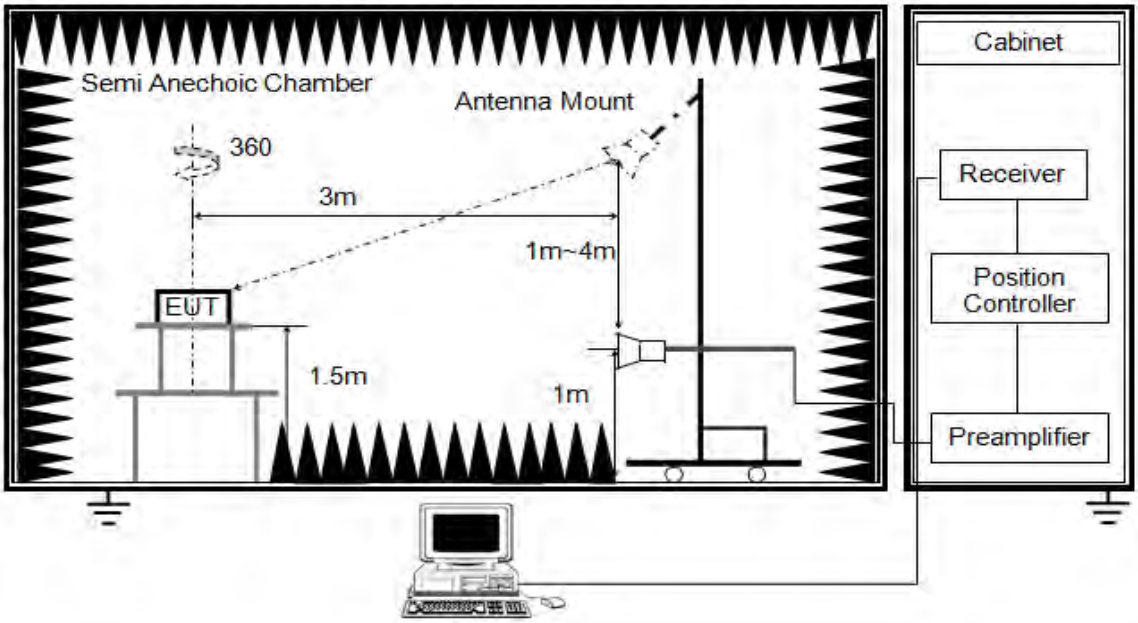
Above 1 GHz



The setting of the spectrum analyser

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 11.11 and 11.12.

2. The EUT was arranged to its worst case and then tune the antenna tower (1.5 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 1.5 m above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1 GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 7.1.ON TIME AND DUTY CYCLE.

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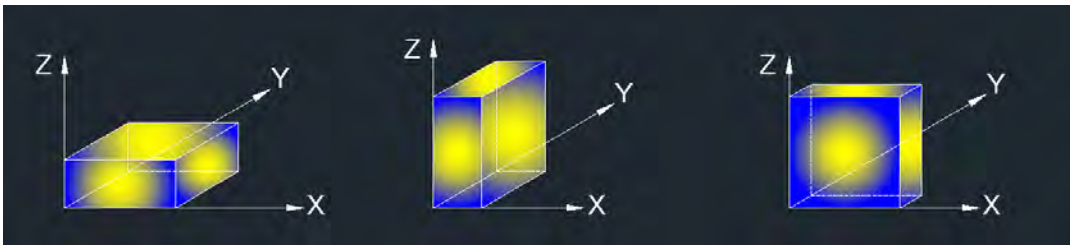
X axis, Y axis, Z axis positions:



Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

Note 2: Simultaneous transmission had been evaluated with the 2.4 GHz WiFi/5 GHz WiFi and BT/BLE transmitter and has no additional or worse emissions found. Please refer to WiFi test report.

Note 3: The EUT was fully exercised with external accessories during the test. In the case of multiple accessory external ports, an external accessory shall be connected to one of each type of port.

Note 4: Both SPEEDWIRE(SPD) antenna and ICT antenna were tested, but only the worst data (SPEEDWIRE(SPD) antenna) was recorded in the report.

Note 5: Both antenna 1 and antenna 2 had been tested, only the worst data (antenna 2) was recorded in the report.

TEST ENVIRONMENT

Temperature	24.6 °C	Relative Humidity	54 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 11.55 V

RESULTS

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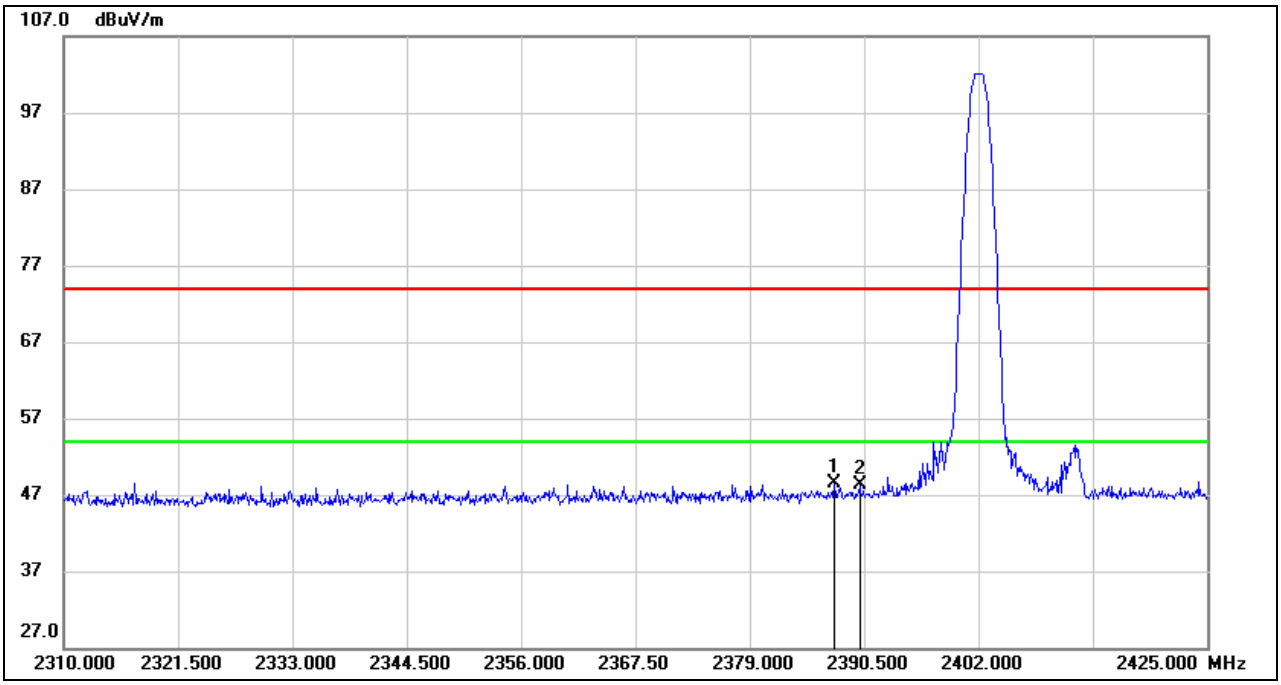
8.1. RESTRICTED BANDEDGE

8.1.1. LE MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2387.510	15.47	32.94	48.41	74.00	-25.59	peak
2	2390.000	15.31	32.94	48.25	74.00	-25.75	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

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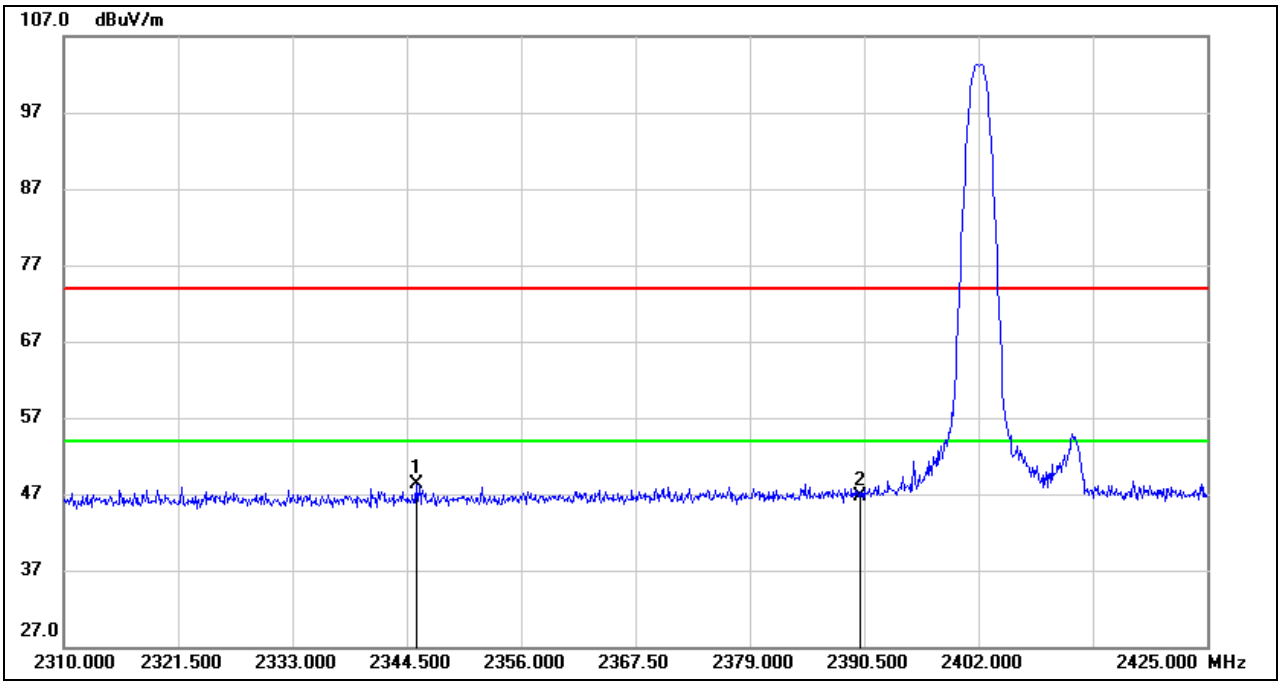
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2345.420	15.55	32.79	48.34	74.00	-25.66	peak
2	2390.000	13.86	32.94	46.80	74.00	-27.20	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

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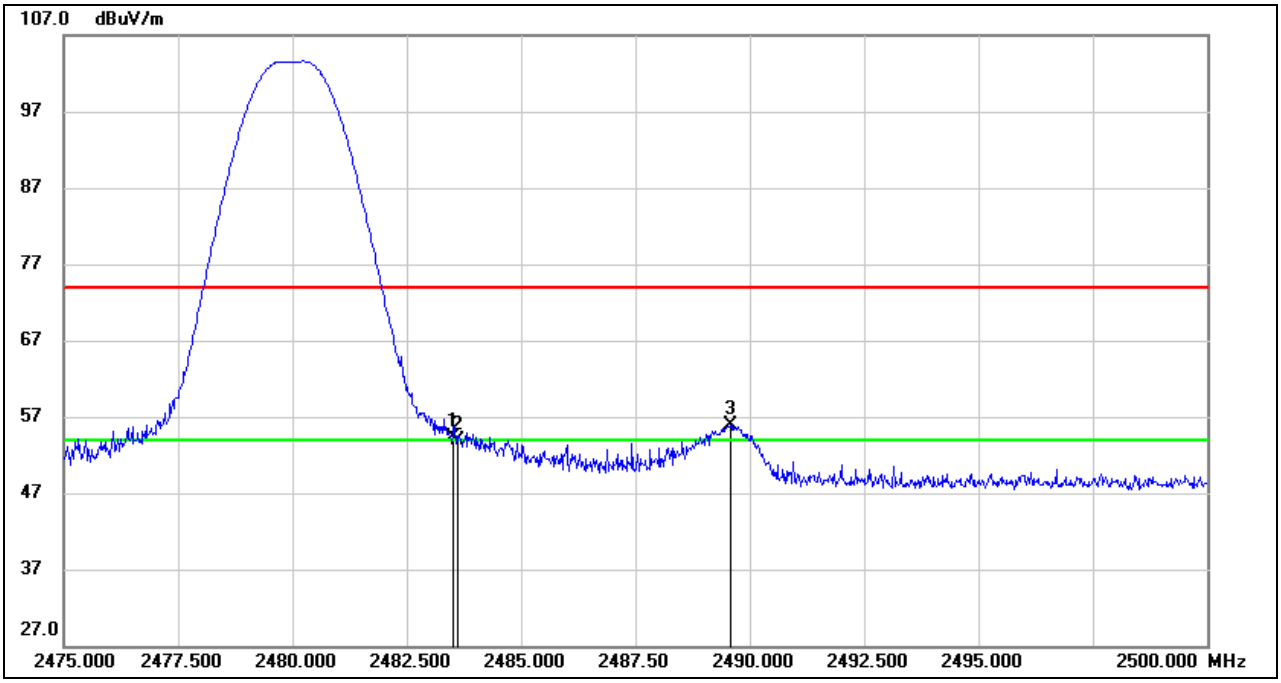
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	20.71	33.58	54.29	74.00	-19.71	peak
2	2483.625	20.35	33.58	53.93	74.00	-20.07	peak
3	2489.575	22.28	33.62	55.90	74.00	-18.10	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

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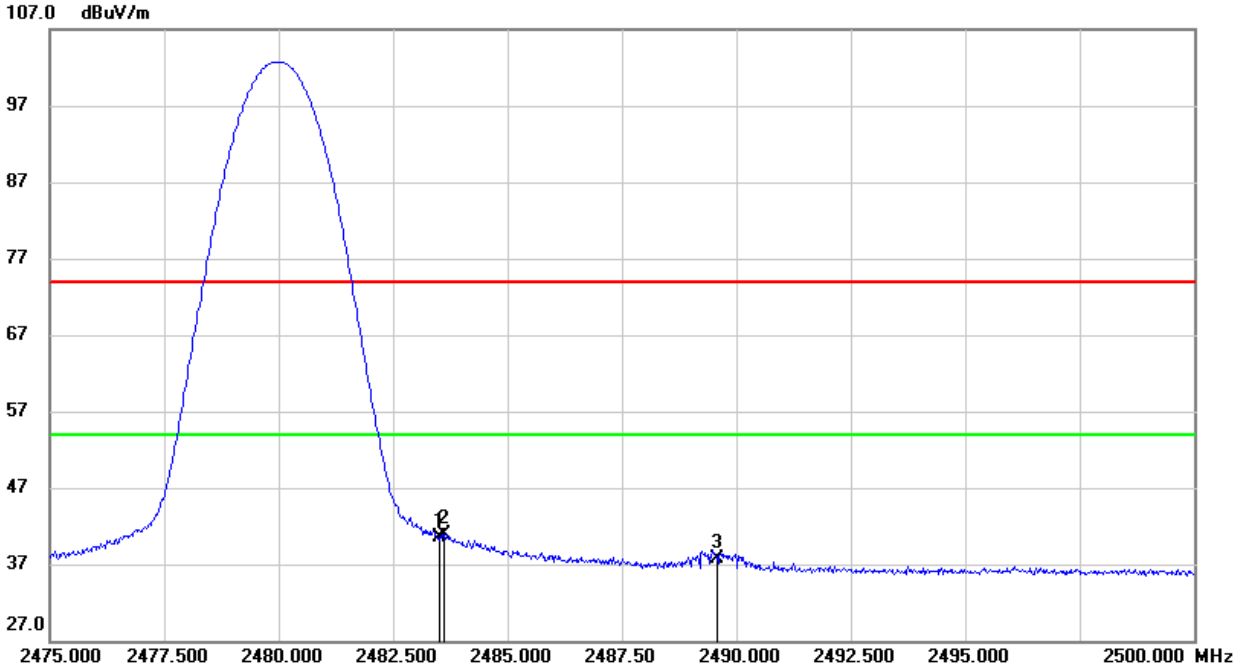
AVG



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	6.94	33.58	40.52	54.00	-13.48	AVG
2	2483.625	7.33	33.58	40.91	54.00	-13.09	AVG
3	2489.575	4.18	33.62	37.80	54.00	-16.20	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
4. For the transmitting duration, please refer to clause 7.1.
5. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

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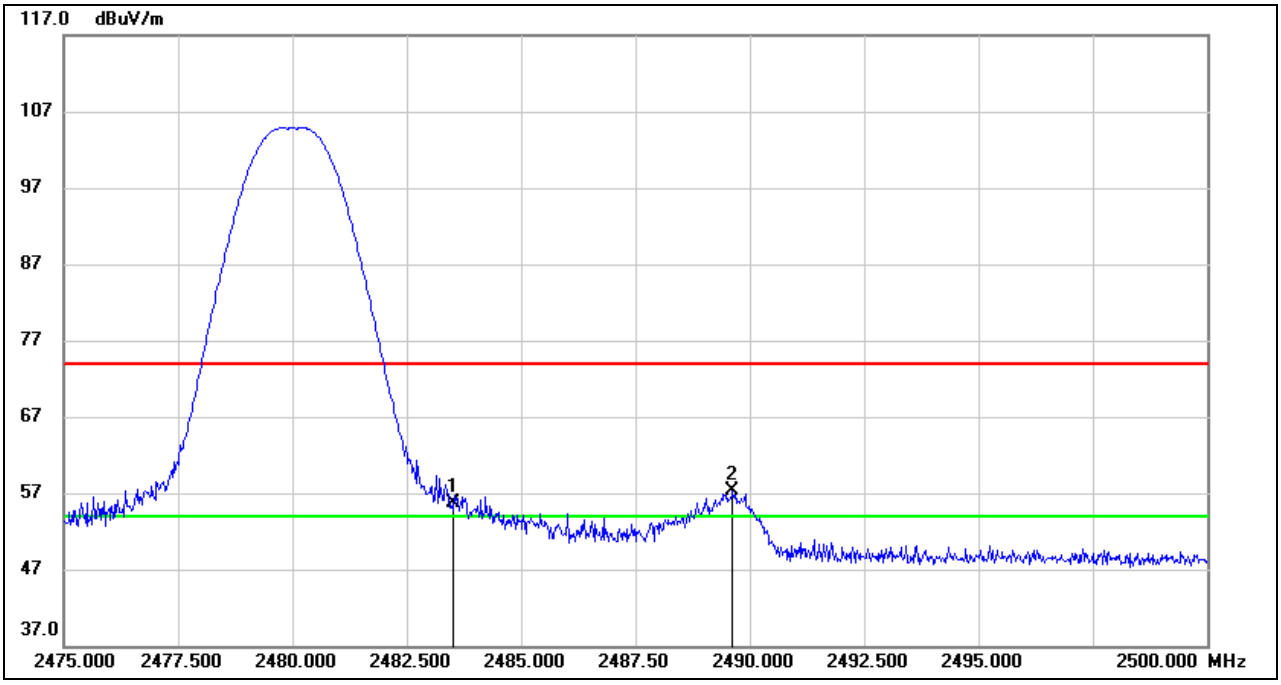
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	22.05	33.58	55.63	74.00	-18.37	peak
2	2489.625	23.64	33.62	57.26	74.00	-16.74	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

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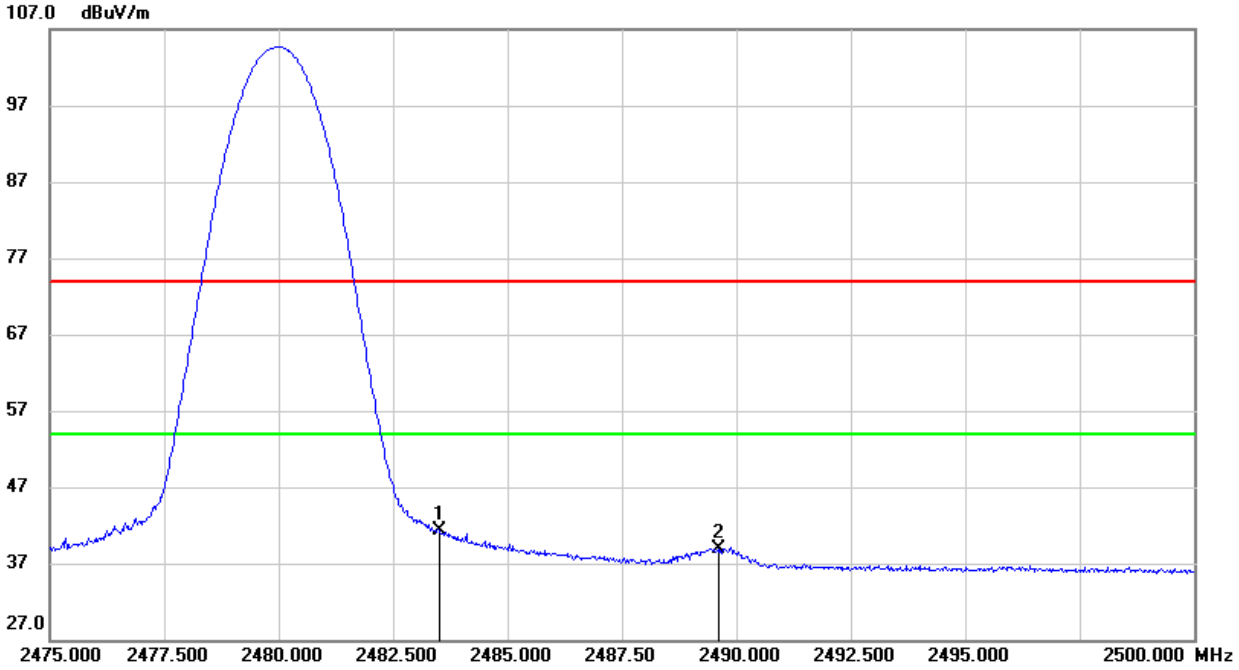
AVG



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	7.69	33.58	41.27	54.00	-12.73	AVG
2	2489.625	5.34	33.62	38.96	54.00	-15.04	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
4. For the transmitting duration, please refer to clause 7.1.
5. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

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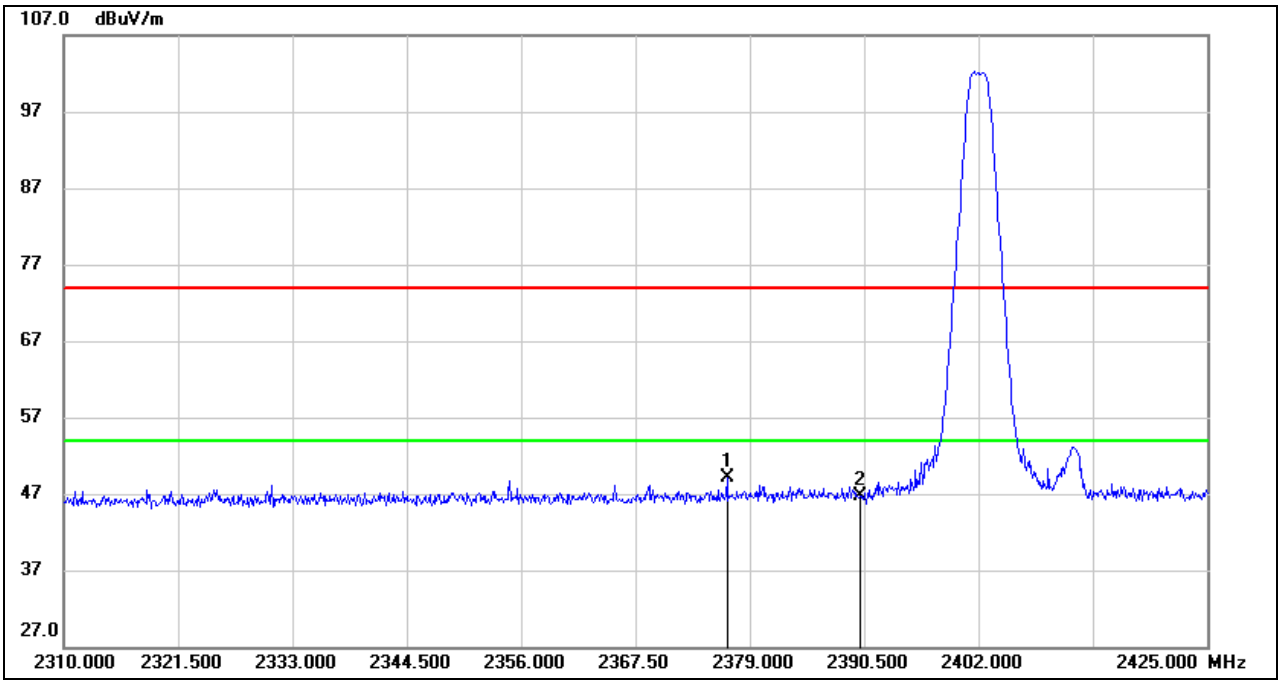
8.1.2. LE 2M MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2376.700	16.21	32.90	49.11	74.00	-24.89	peak
2	2390.000	13.81	32.94	46.75	74.00	-27.25	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

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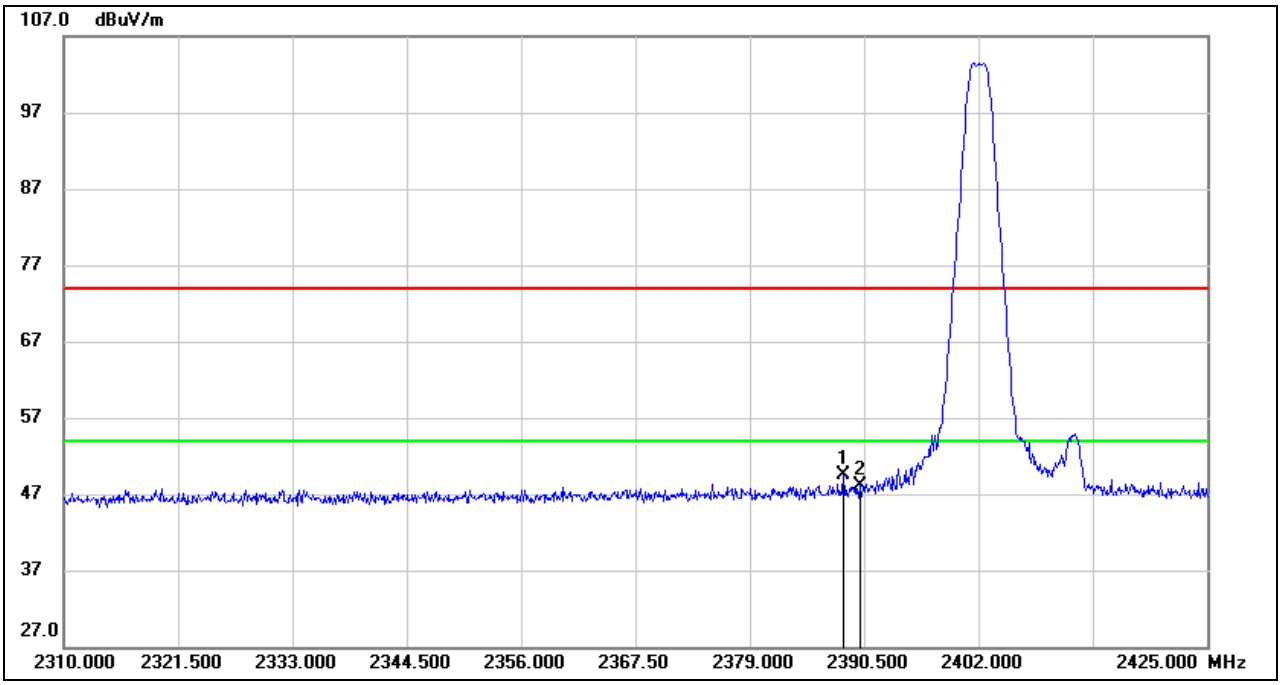
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2388.430	16.47	32.94	49.41	74.00	-24.59	peak
2	2390.000	15.11	32.94	48.05	74.00	-25.95	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

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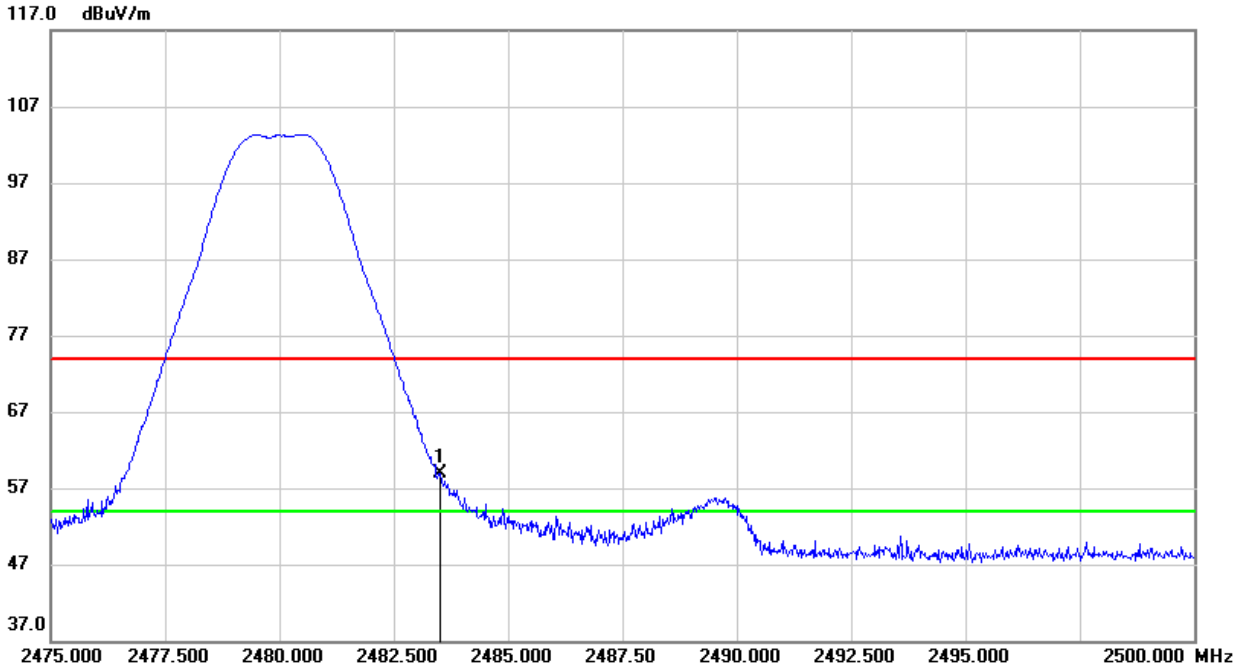
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	25.27	33.58	58.85	74.00	-15.15	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

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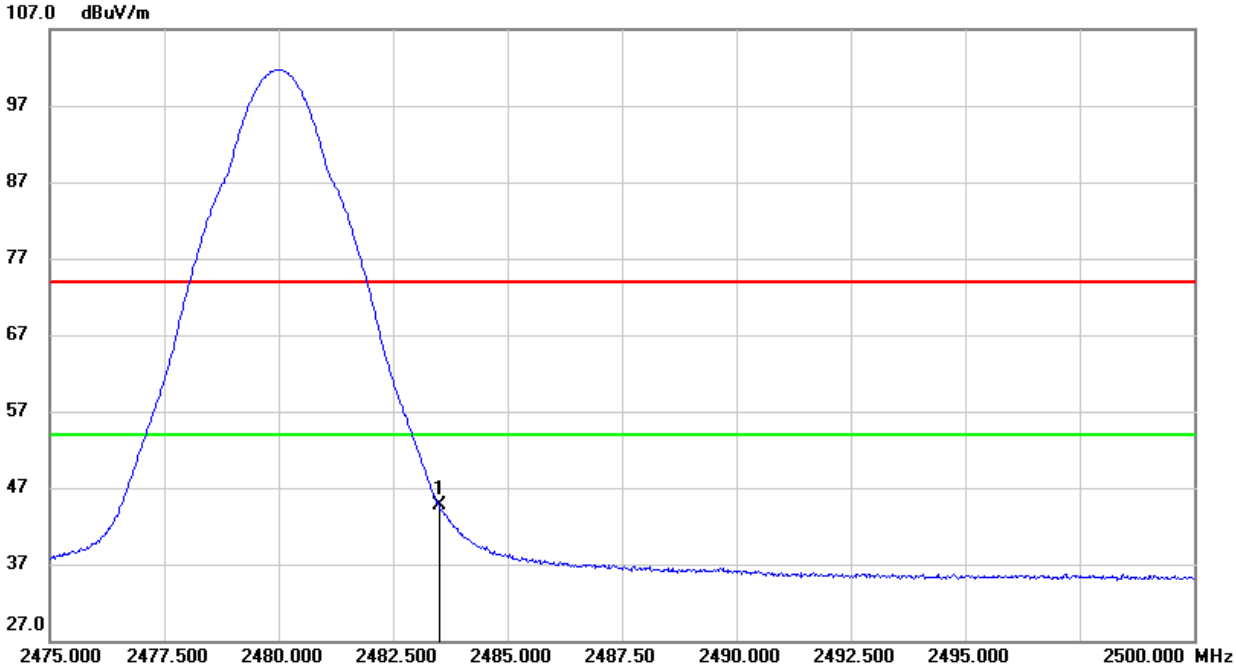
AVG



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	11.08	33.58	44.66	54.00	-9.34	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
4. For the transmitting duration, please refer to clause 7.1.
5. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

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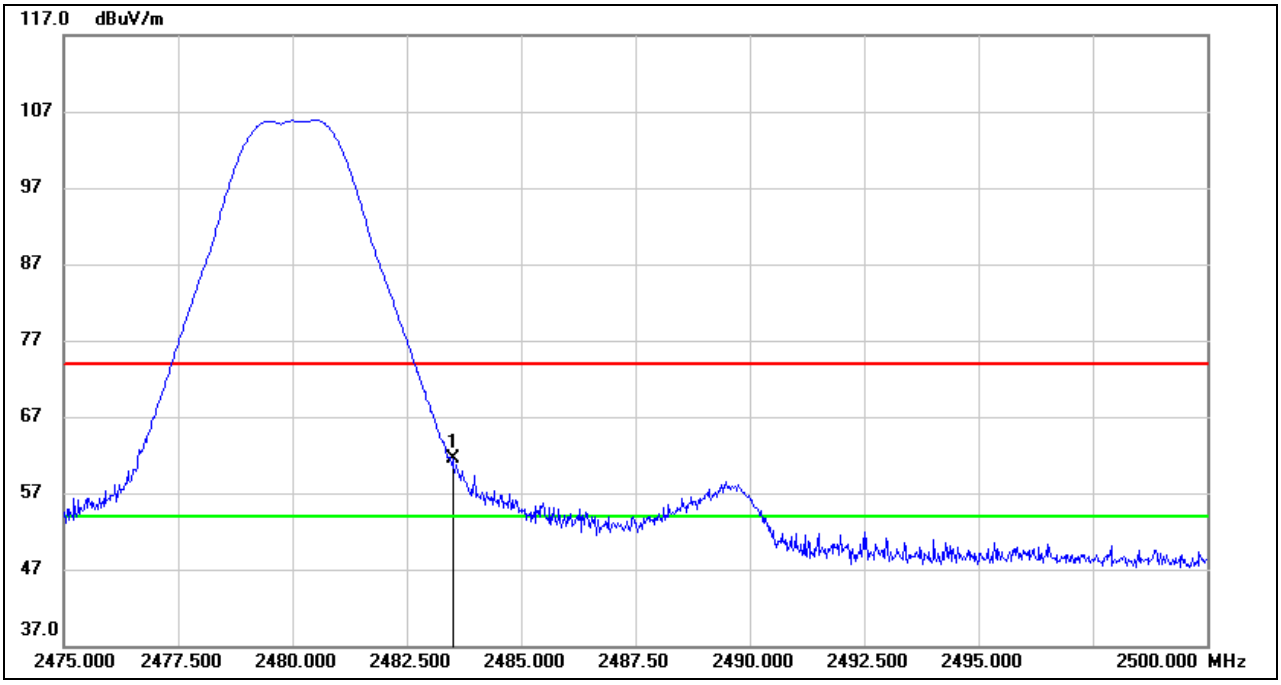
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

PEAK



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	27.89	33.58	61.47	74.00	-12.53	peak

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

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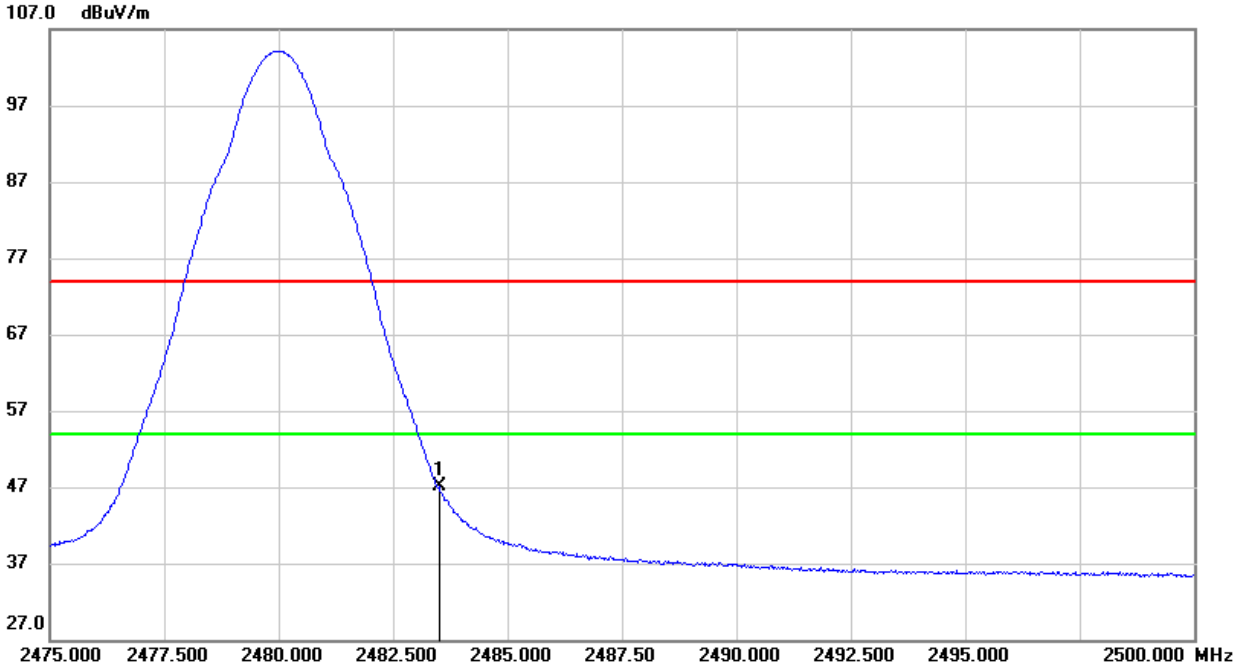
AVG



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	13.44	33.58	47.02	54.00	-6.98	AVG

Note: 1. Measurement = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. AVG: VBW=1/Ton, where: Ton is the transmitting duration.
4. For the transmitting duration, please refer to clause 7.1.
5. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

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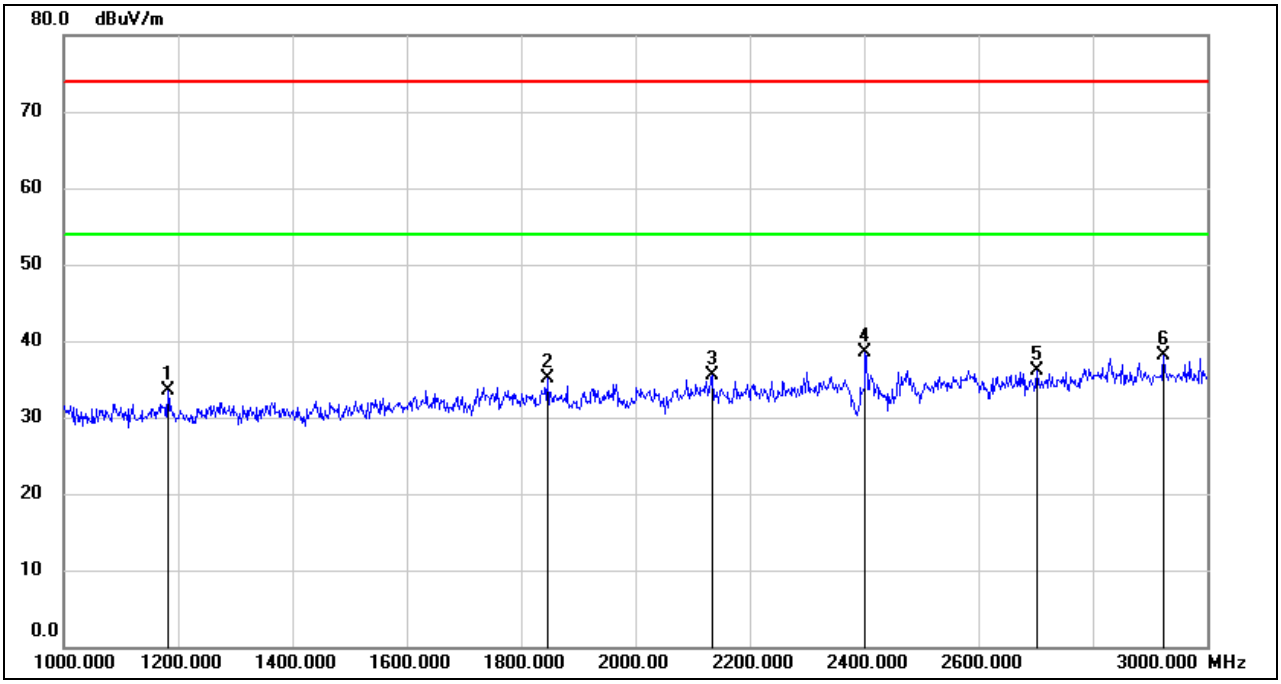
8.2. SPURIOUS EMISSIONS (1 GHz ~ 3 GHz)

8.2.1. LE MODE

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1182.000	46.41	-12.82	33.59	74.00	-40.41	peak
2	1846.000	45.11	-9.93	35.18	74.00	-38.82	peak
3	2134.000	44.58	-8.99	35.59	74.00	-38.41	peak
4	2402.000	46.44	-7.85	38.59	/	/	fundamental
5	2702.000	43.17	-7.11	36.06	74.00	-37.94	peak
6	2924.000	43.65	-5.47	38.18	74.00	-35.82	peak

Note:
1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in then spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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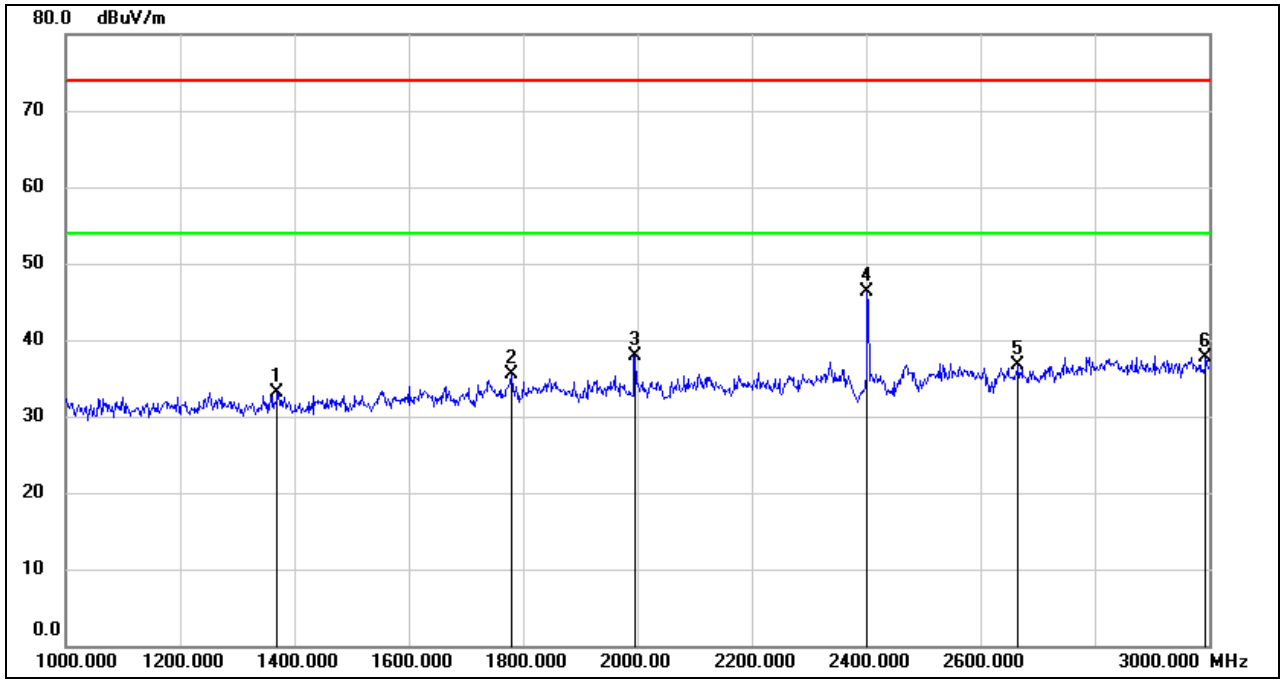
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1370.000	45.49	-12.37	33.12	74.00	-40.88	peak
2	1780.000	45.59	-10.12	35.47	74.00	-38.53	peak
3	1996.000	47.68	-9.83	37.85	74.00	-36.15	peak
4	2402.000	54.22	-7.85	46.37	/	/	fundamental
5	2666.000	43.95	-7.32	36.63	74.00	-37.37	peak
6	2994.000	42.97	-5.31	37.66	74.00	-36.34	peak

Note:
1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in then spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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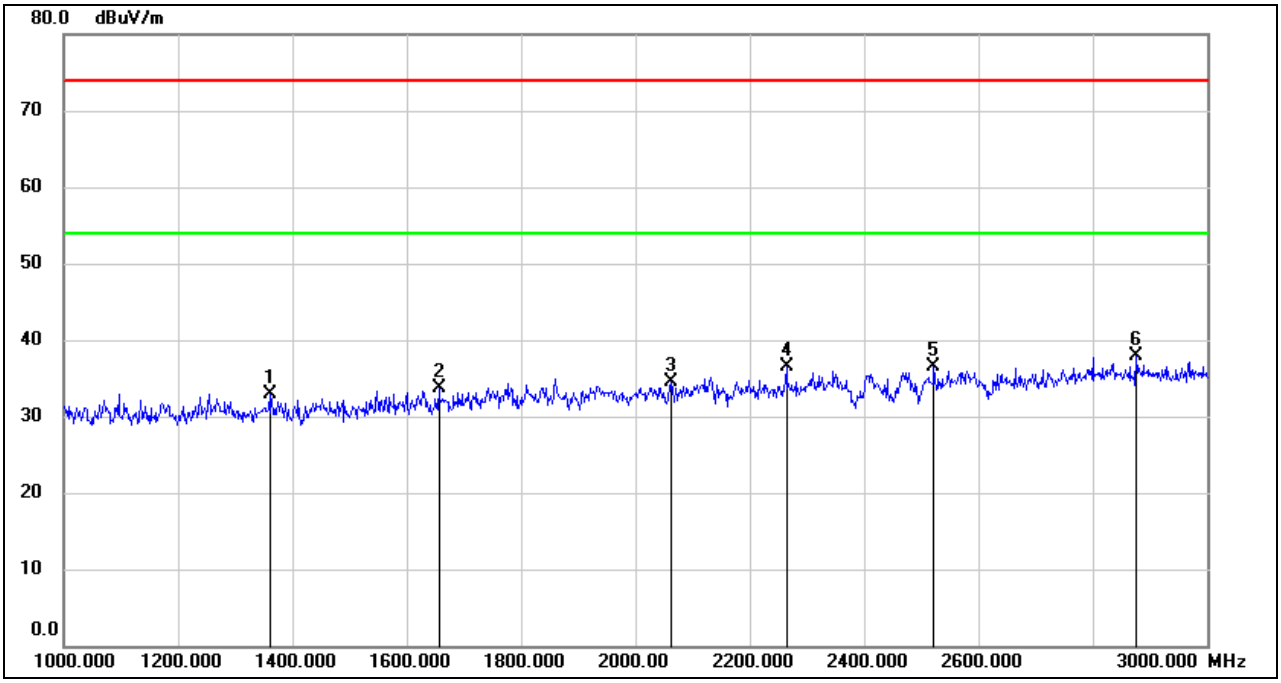
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1360.000	45.35	-12.36	32.99	74.00	-41.01	peak
2	1656.000	44.83	-11.13	33.70	74.00	-40.30	peak
3	2062.000	44.00	-9.41	34.59	74.00	-39.41	peak
4	2264.000	44.94	-8.36	36.58	74.00	-37.42	peak
5	2522.000	43.74	-7.28	36.46	74.00	-37.54	peak
6	2876.000	43.55	-5.66	37.89	74.00	-36.11	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in then spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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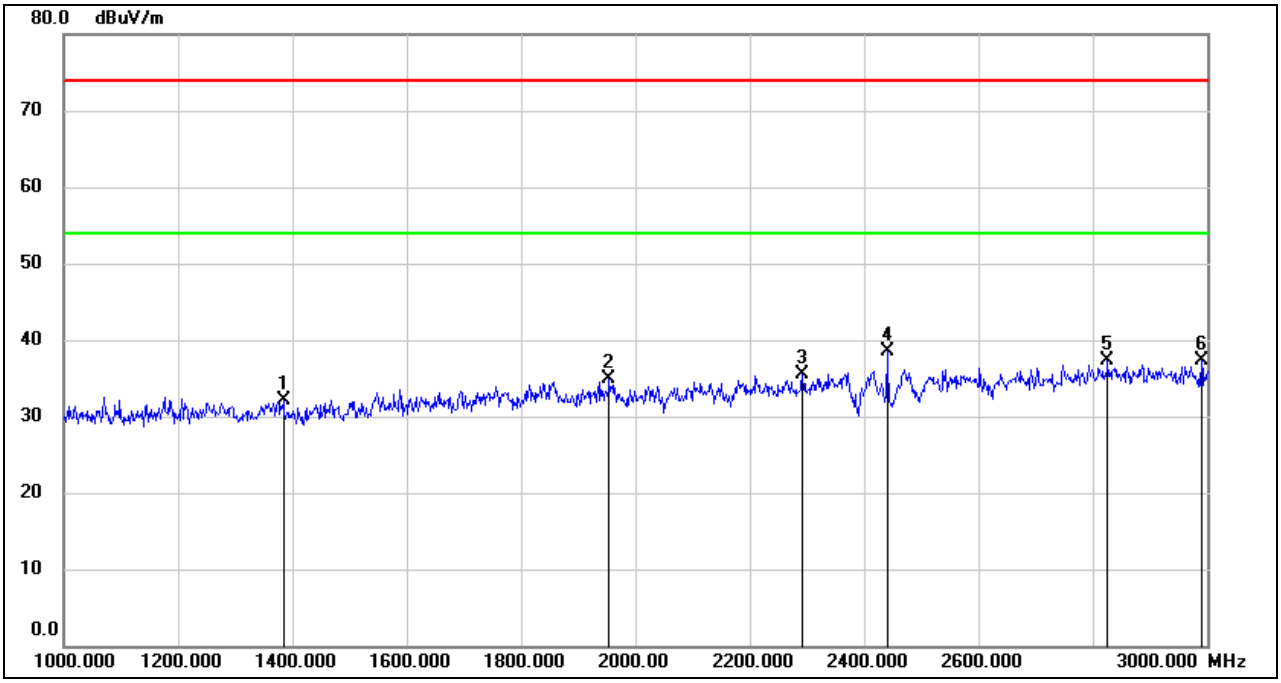
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1384.000	44.42	-12.38	32.04	74.00	-41.96	peak
2	1954.000	44.72	-9.87	34.85	74.00	-39.15	peak
3	2292.000	43.80	-8.23	35.57	74.00	-38.43	peak
4	2440.000	46.14	-7.59	38.55	/	/	fundamental
5	2826.000	43.14	-5.92	37.22	74.00	-36.78	peak
6	2990.000	42.59	-5.33	37.26	74.00	-36.74	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in then spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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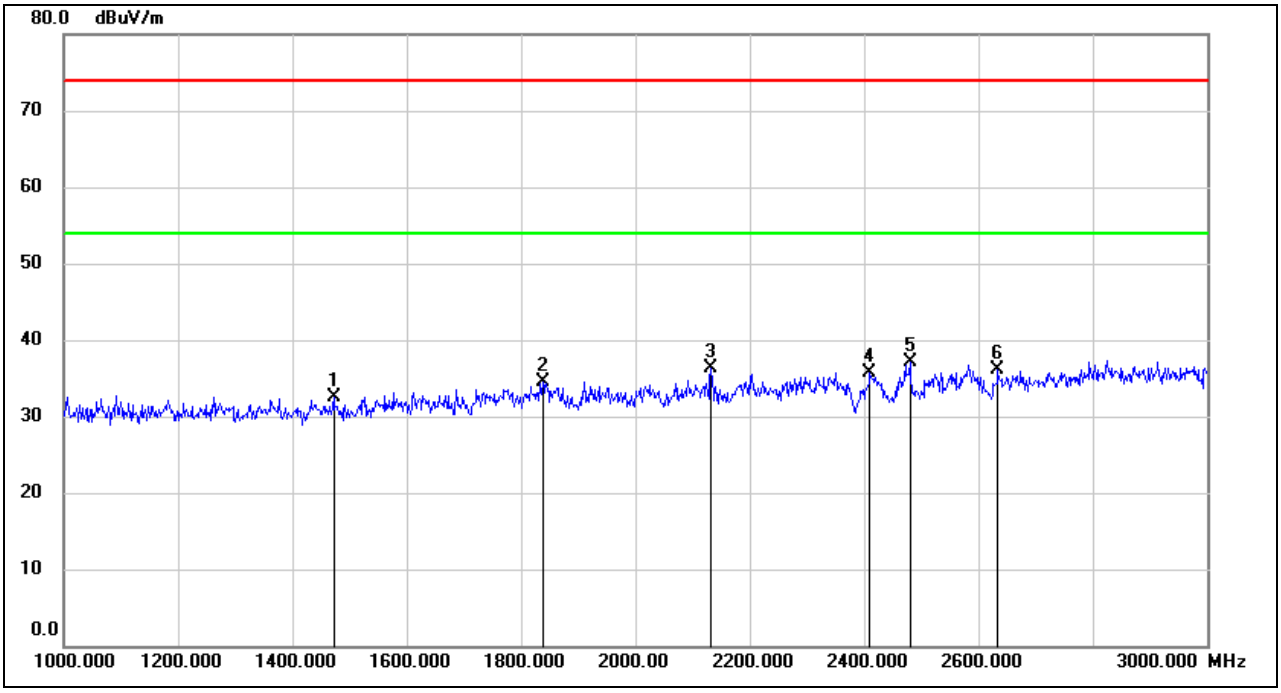
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1472.000	44.75	-12.25	32.50	74.00	-41.50	peak
2	1838.000	44.47	-9.93	34.54	74.00	-39.46	peak
3	2132.000	45.38	-9.00	36.38	74.00	-37.62	peak
4	2410.000	43.53	-7.78	35.75	74.00	-38.25	peak
5	2480.000	44.43	-7.31	37.12	/	/	fundamental
6	2634.000	43.55	-7.51	36.04	74.00	-37.96	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in then spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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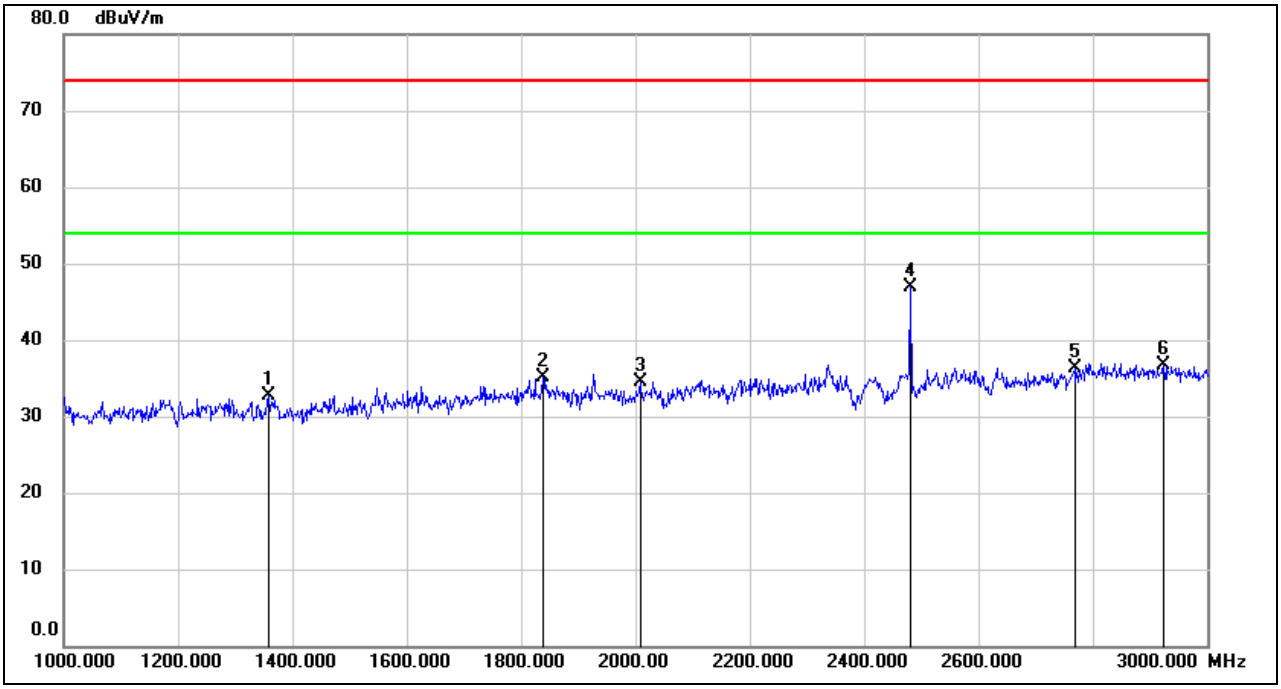
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1358.000	45.06	-12.37	32.69	74.00	-41.31	peak
2	1838.000	45.11	-9.93	35.18	74.00	-38.82	peak
3	2008.000	44.22	-9.78	34.44	74.00	-39.56	peak
4	2480.000	54.24	-7.31	46.93	/	/	fundamental
5	2768.000	42.68	-6.40	36.28	74.00	-37.72	peak
6	2924.000	42.14	-5.47	36.67	74.00	-37.33	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in then spurious frequency bands and the authorized band was not corrected for Band reject filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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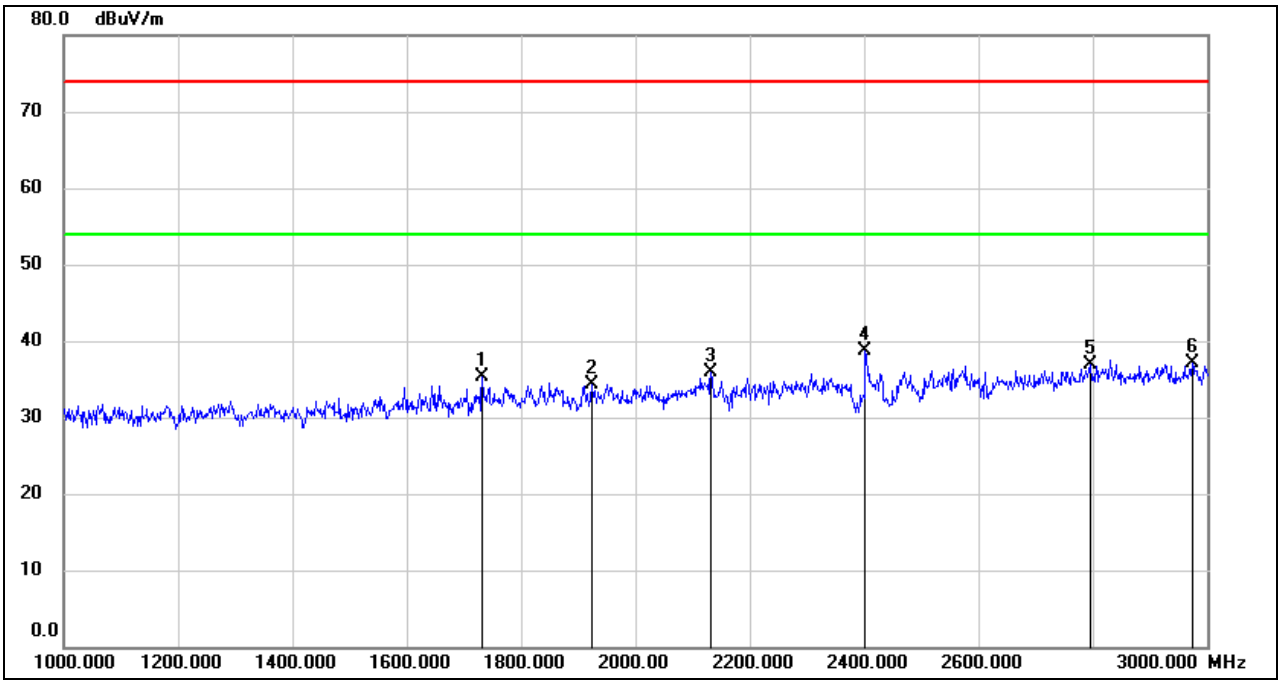
8.2.2. LE 2M MODE

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1732.000	45.95	-10.59	35.36	74.00	-38.64	peak
2	1924.000	44.17	-9.93	34.24	74.00	-39.76	peak
3	2132.000	44.82	-9.00	35.82	74.00	-38.18	peak
4	2402.000	46.46	-7.85	38.61	/	/	fundamental
5	2796.000	42.93	-6.10	36.83	74.00	-37.17	peak
6	2974.000	42.48	-5.35	37.13	74.00	-36.87	peak

Note:
1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in then spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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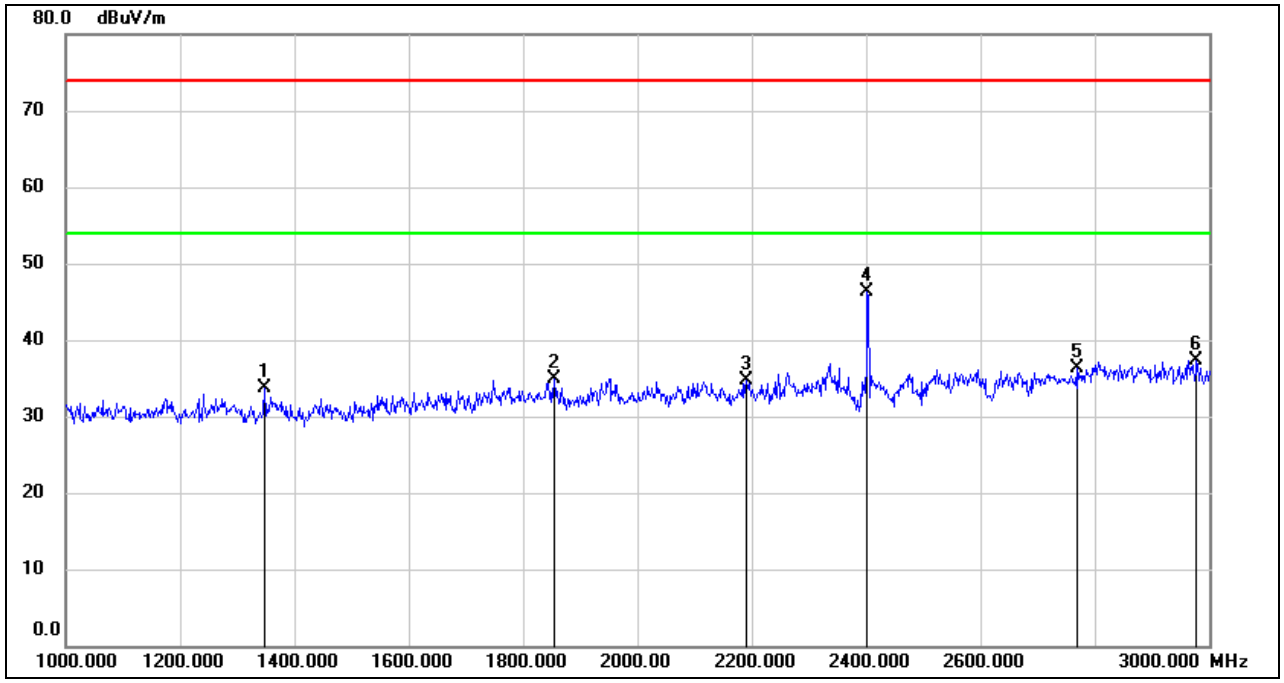
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1348.000	45.97	-12.36	33.61	74.00	-40.39	peak
2	1854.000	44.75	-9.93	34.82	74.00	-39.18	peak
3	2190.000	43.44	-8.72	34.72	74.00	-39.28	peak
4	2402.000	54.21	-7.85	46.36	/	/	fundamental
5	2768.000	42.65	-6.40	36.25	74.00	-37.75	peak
6	2978.000	42.69	-5.35	37.34	74.00	-36.66	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in then spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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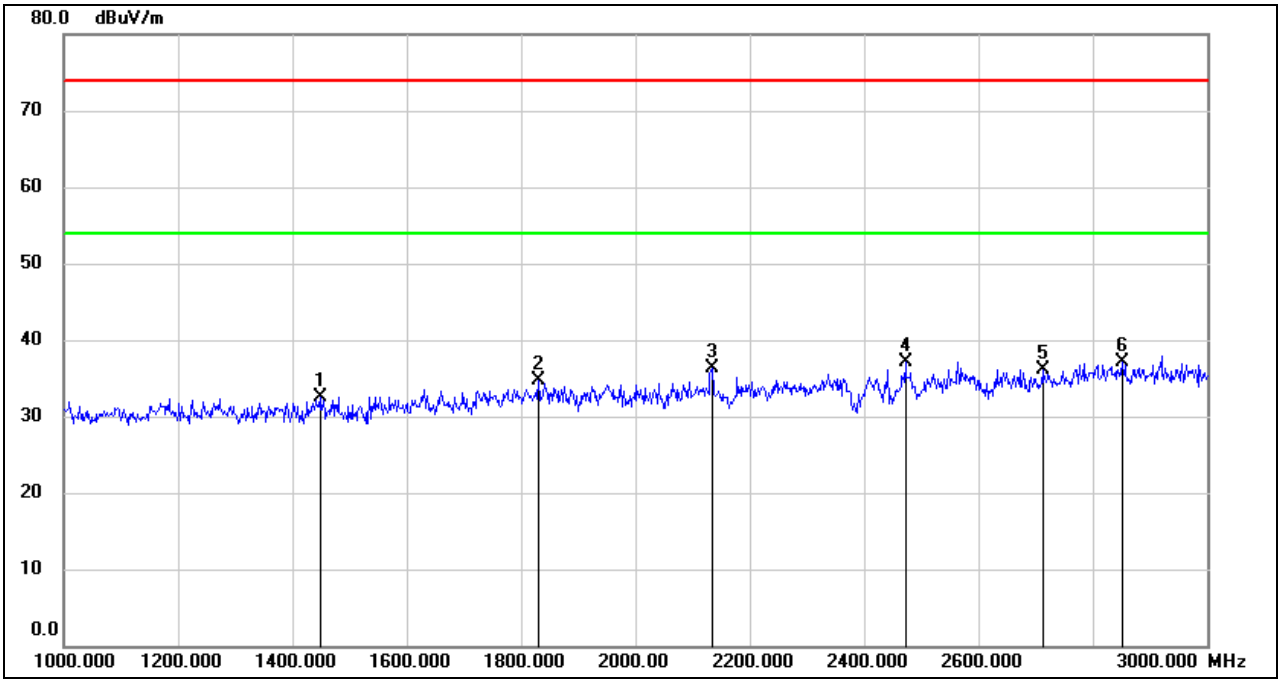
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1448.000	44.88	-12.30	32.58	74.00	-41.42	peak
2	1830.000	44.54	-9.93	34.61	74.00	-39.39	peak
3	2134.000	45.39	-8.99	36.40	74.00	-37.60	peak
4	2472.000	44.52	-7.36	37.16	74.00	-36.84	peak
5	2712.000	43.13	-7.00	36.13	74.00	-37.87	peak
6	2852.000	42.89	-5.78	37.11	74.00	-36.89	peak

Note:
1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in then spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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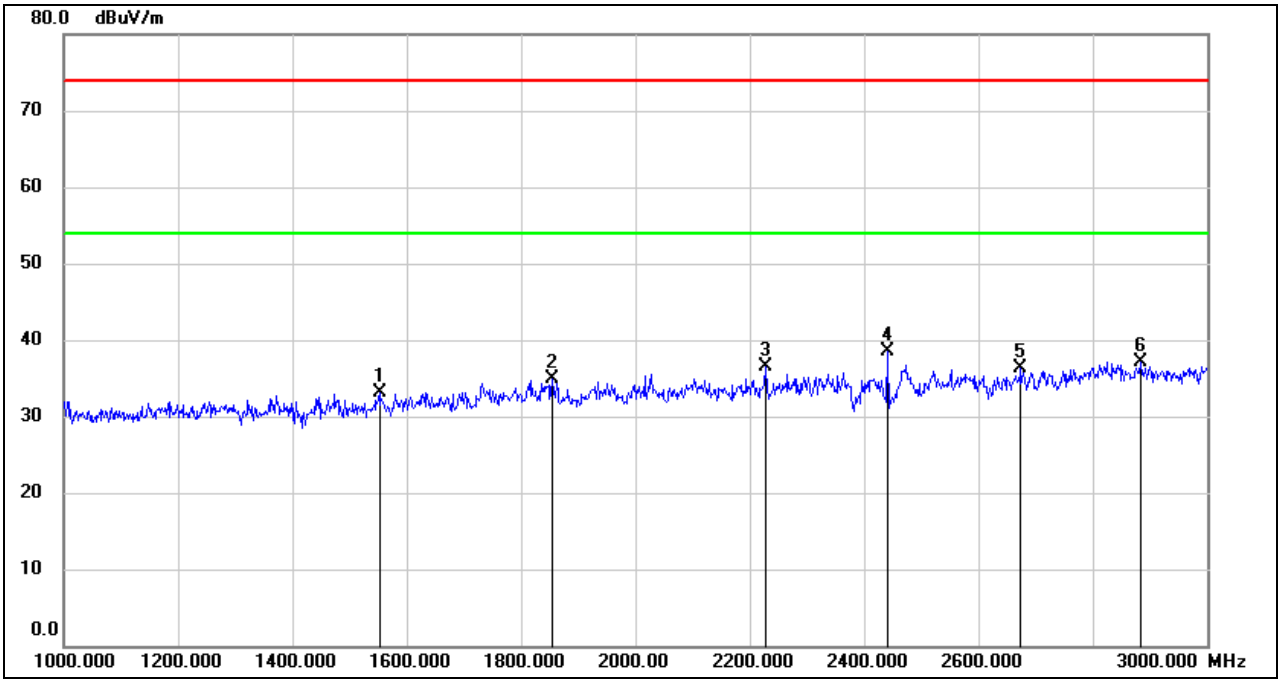
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1552.000	44.86	-11.79	33.07	74.00	-40.93	peak
2	1854.000	44.78	-9.93	34.85	74.00	-39.15	peak
3	2228.000	44.94	-8.53	36.41	74.00	-37.59	peak
4	2440.000	46.08	-7.59	38.49	/	/	fundamental
5	2674.000	43.53	-7.27	36.26	74.00	-37.74	peak
6	2884.000	42.69	-5.61	37.08	74.00	-36.92	peak

Note:
1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in then spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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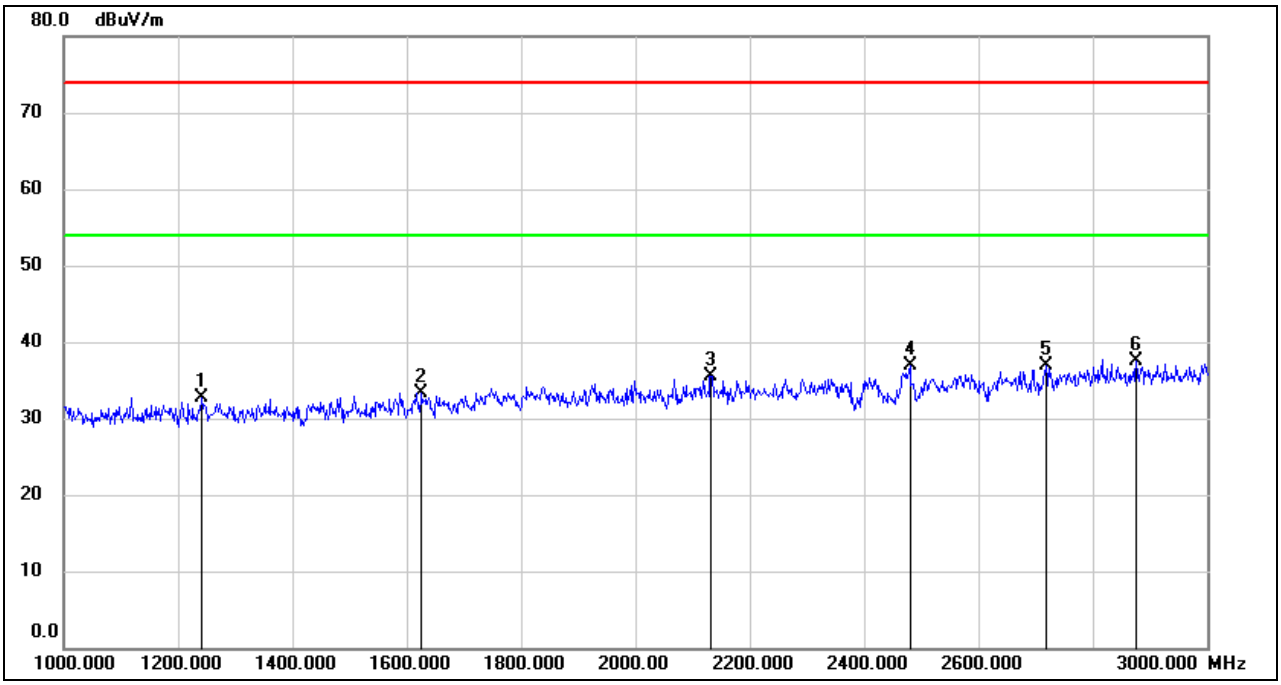
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1242.000	45.29	-12.53	32.76	74.00	-41.24	peak
2	1626.000	44.64	-11.27	33.37	74.00	-40.63	peak
3	2132.000	44.49	-9.00	35.49	74.00	-38.51	peak
4	2480.000	44.22	-7.31	36.91	/	/	fundamental
5	2718.000	43.75	-6.94	36.81	74.00	-37.19	peak
6	2876.000	43.10	-5.66	37.44	74.00	-36.56	peak

Note:
1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in then spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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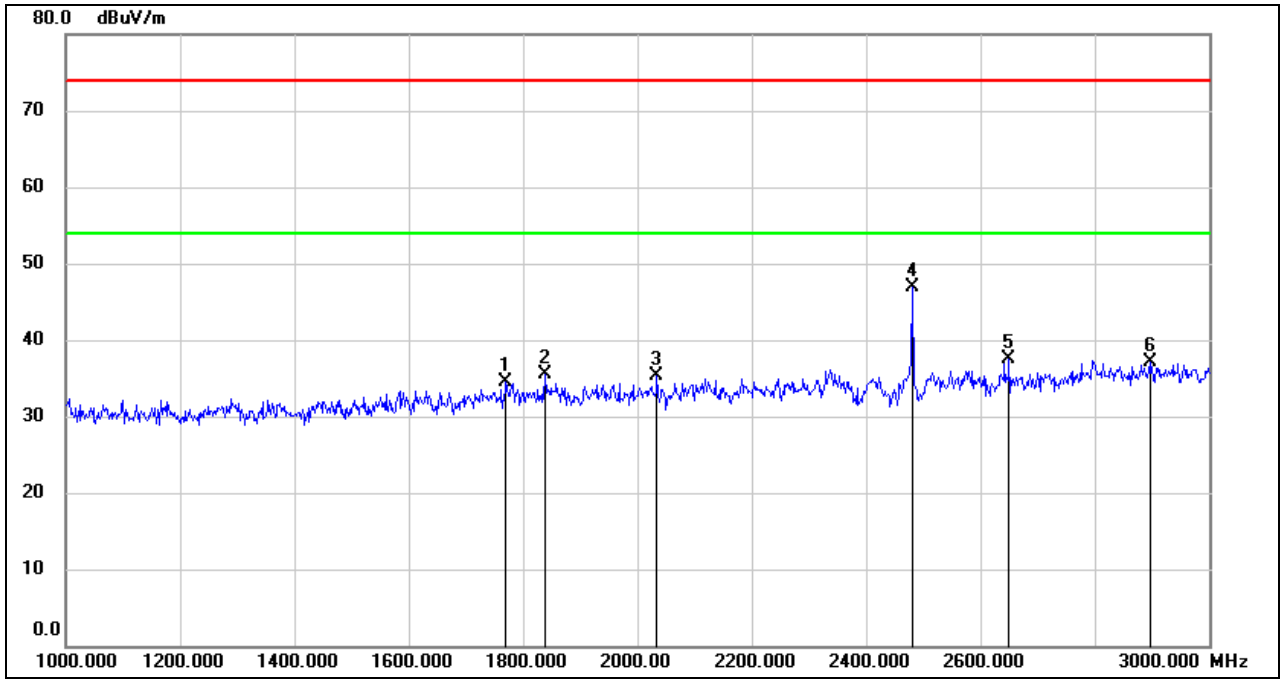
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1770.000	44.62	-10.21	34.41	74.00	-39.59	peak
2	1838.000	45.52	-9.93	35.59	74.00	-38.41	peak
3	2034.000	44.81	-9.59	35.22	74.00	-38.78	peak
4	2480.000	54.19	-7.31	46.88	/	/	fundamental
5	2650.000	44.95	-7.42	37.53	74.00	-36.47	peak
6	2896.000	42.58	-5.54	37.04	74.00	-36.96	peak

Note:
1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in then spurious frequency bands and the authorized band was not corrected for Band reject filter losses
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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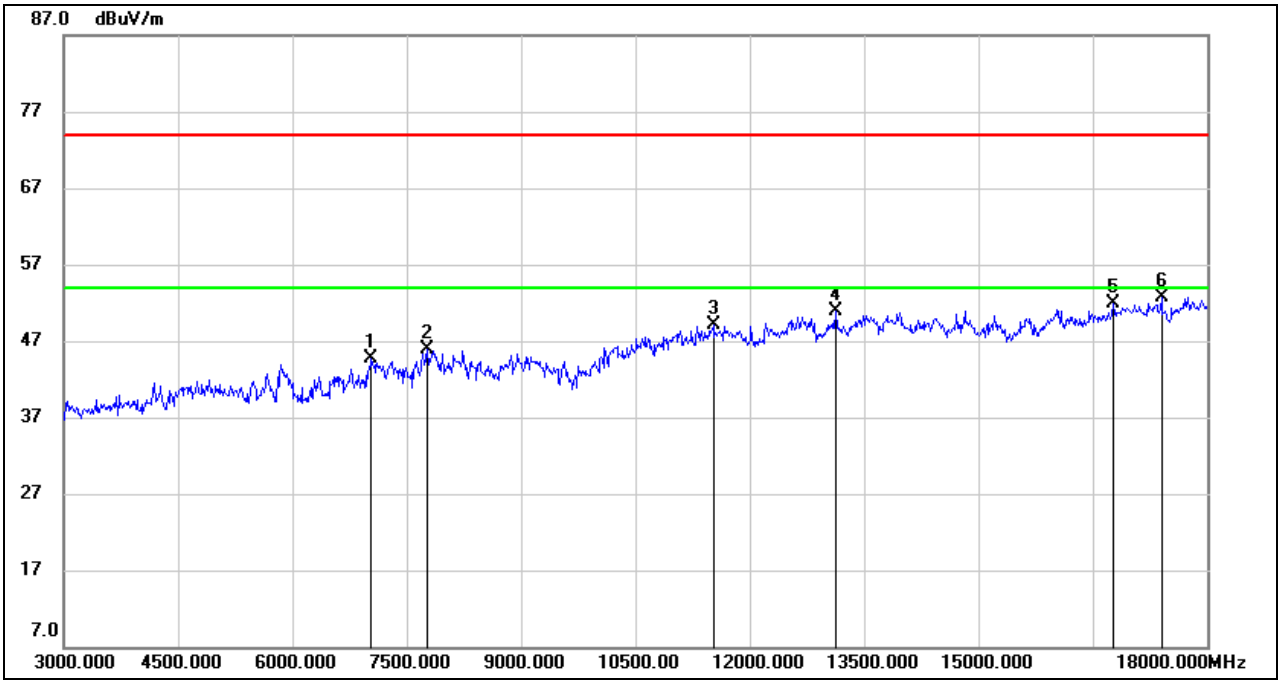
8.3. SPURIOUS EMISSIONS (3 GHz ~ 18 GHz)

8.3.1. LE MODE

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	7035.000	38.97	5.81	44.78	74.00	-29.22	peak
2	7770.000	38.34	7.50	45.84	74.00	-28.16	peak
3	11520.000	35.77	13.38	49.15	74.00	-24.85	peak
4	13125.000	35.78	15.17	50.95	74.00	-23.05	peak
5	16770.000	31.86	19.95	51.81	74.00	-22.19	peak
6	17400.000	31.27	21.41	52.68	74.00	-21.32	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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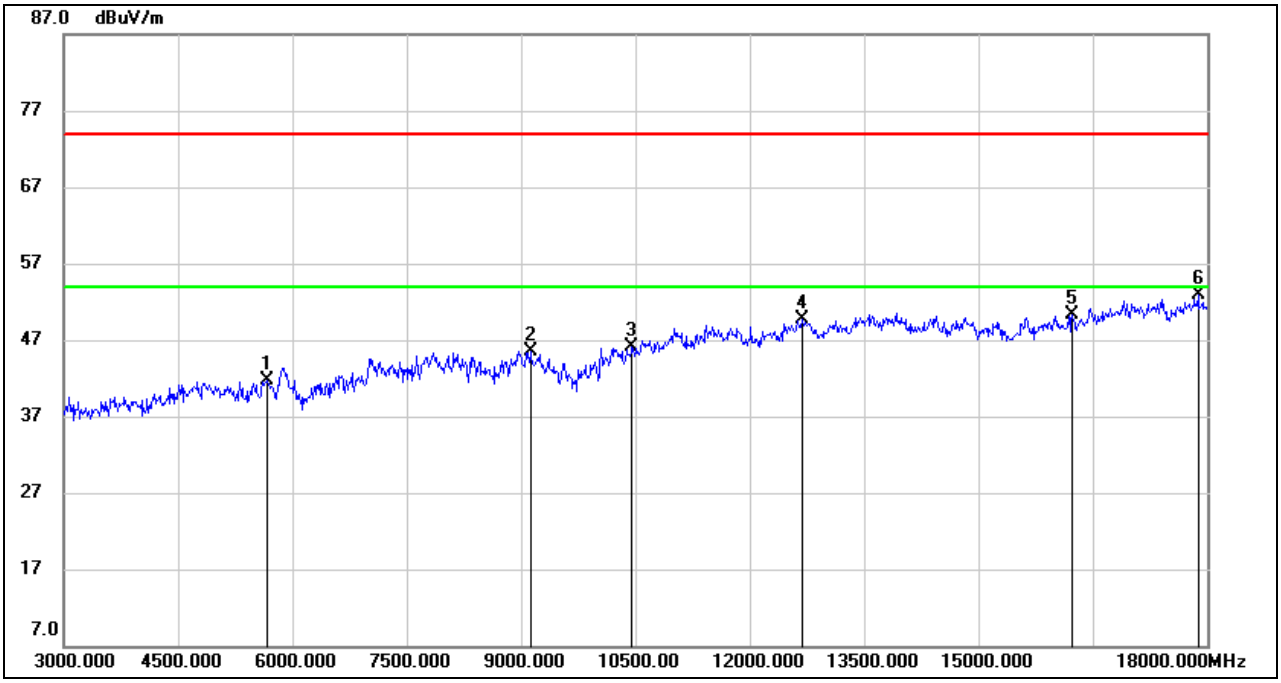
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5670.000	38.93	2.72	41.65	74.00	-32.35	peak
2	9120.000	36.42	9.16	45.58	74.00	-28.42	peak
3	10455.000	34.94	11.19	46.13	74.00	-27.87	peak
4	12690.000	35.39	14.25	49.64	74.00	-24.36	peak
5	16230.000	31.84	18.46	50.30	74.00	-23.70	peak
6	17880.000	29.50	23.34	52.84	74.00	-21.16	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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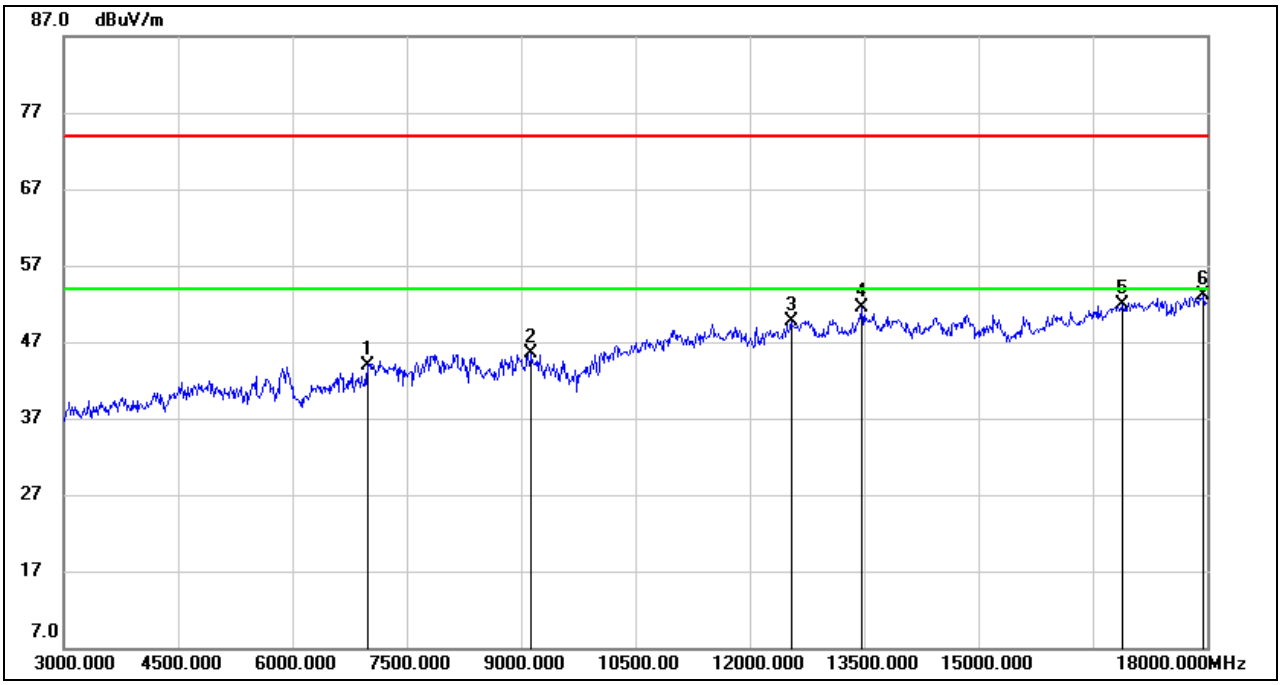
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	6990.000	38.04	5.77	43.81	74.00	-30.19	peak
2	9135.000	36.48	9.07	45.55	74.00	-28.45	peak
3	12540.000	35.39	14.33	49.72	74.00	-24.28	peak
4	13470.000	35.56	15.87	51.43	74.00	-22.57	peak
5	16890.000	31.84	19.97	51.81	74.00	-22.19	peak
6	17955.000	29.65	23.41	53.06	74.00	-20.94	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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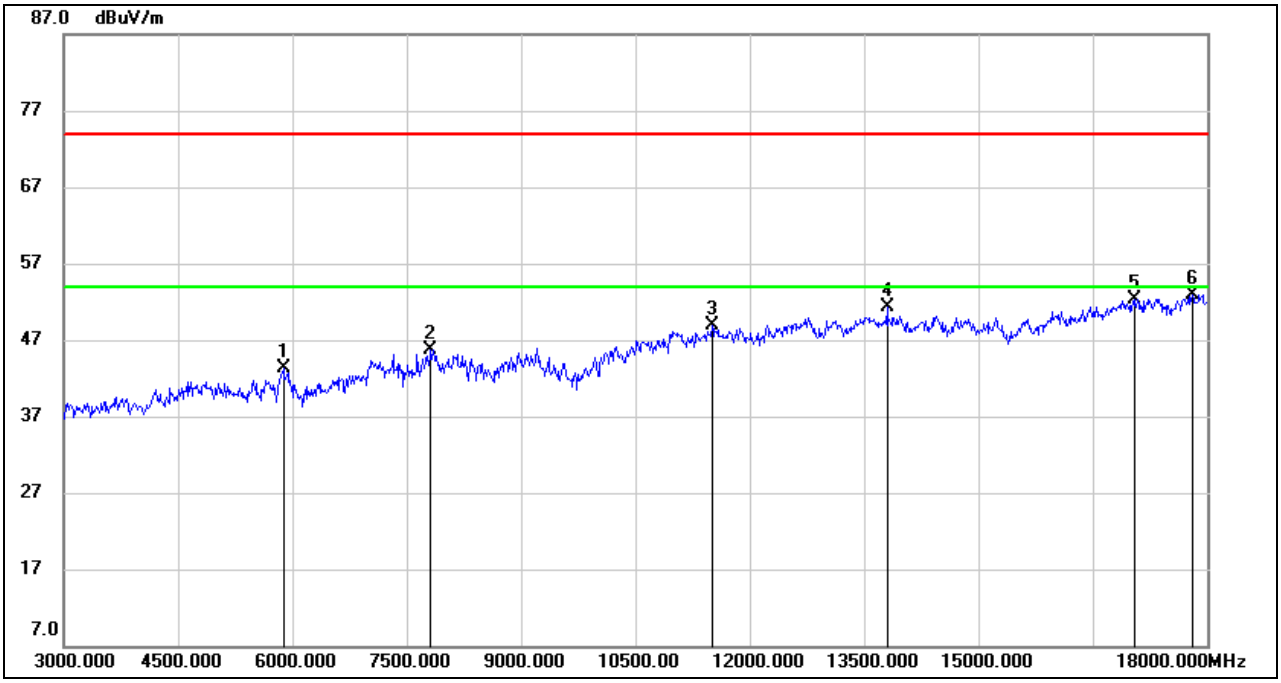
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5880.000	38.68	4.59	43.27	74.00	-30.73	peak
2	7815.000	37.89	7.83	45.72	74.00	-28.28	peak
3	11505.000	35.53	13.42	48.95	74.00	-25.05	peak
4	13800.000	34.26	17.10	51.36	74.00	-22.64	peak
5	17040.000	31.86	20.49	52.35	74.00	-21.65	peak
6	17805.000	29.64	23.31	52.95	74.00	-21.05	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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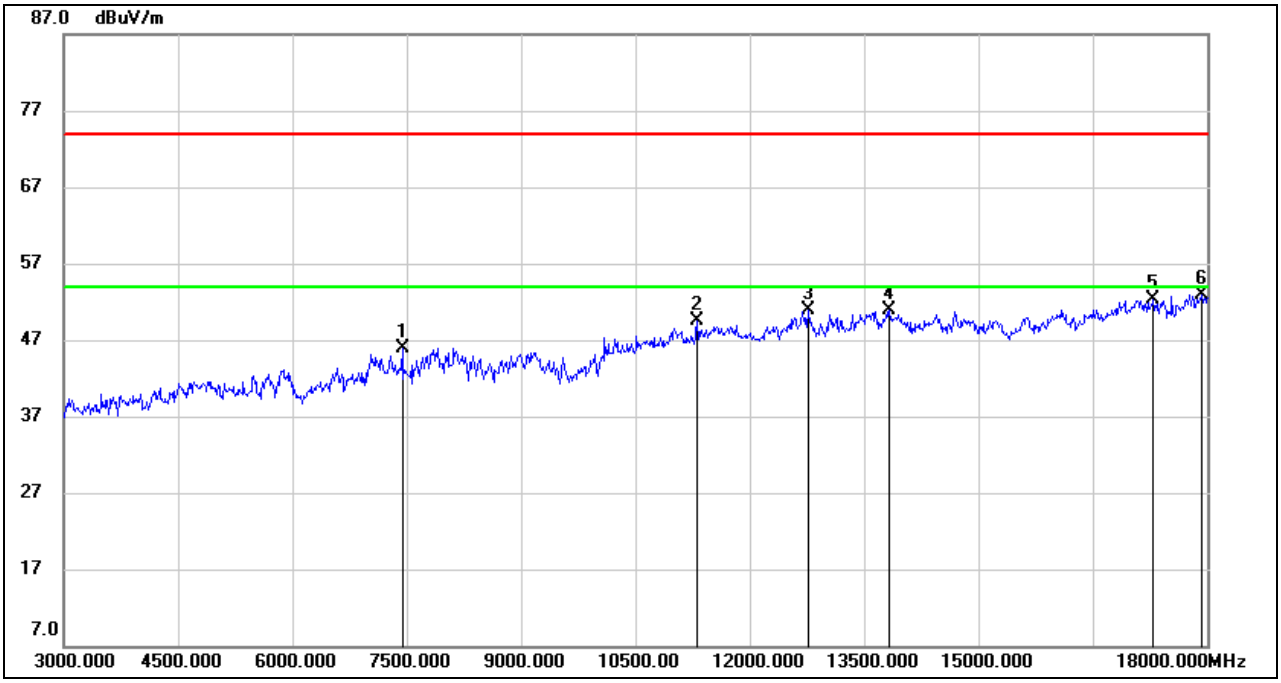
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	7440.000	39.67	6.32	45.99	74.00	-28.01	peak
2	11310.000	37.08	12.37	49.45	74.00	-24.55	peak
3	12765.000	35.72	15.18	50.90	74.00	-23.10	peak
4	13830.000	34.03	16.84	50.87	74.00	-23.13	peak
5	17295.000	30.51	21.71	52.22	74.00	-21.78	peak
6	17925.000	29.55	23.37	52.92	74.00	-21.08	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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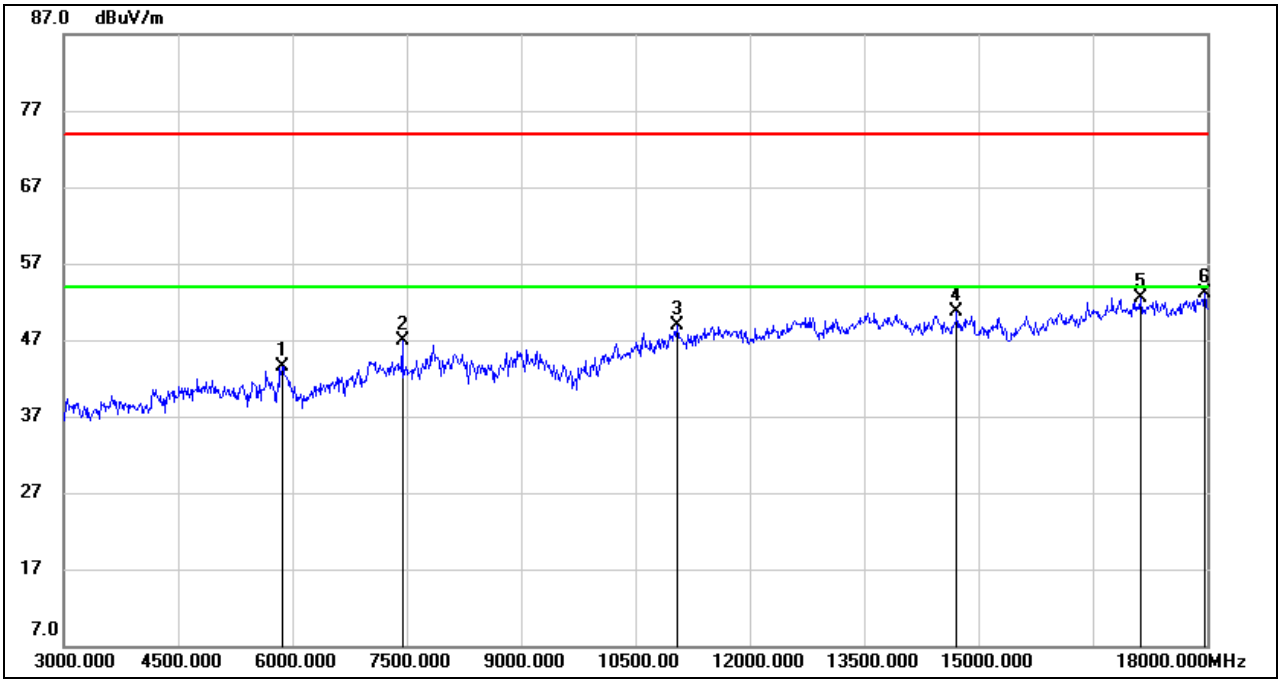
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5865.000	39.15	4.30	43.45	74.00	-30.55	peak
2	7440.000	40.67	6.32	46.99	74.00	-27.01	peak
3	11040.000	36.32	12.61	48.93	74.00	-25.07	peak
4	14715.000	34.58	16.03	50.61	74.00	-23.39	peak
5	17130.000	31.75	20.72	52.47	74.00	-21.53	peak
6	17970.000	29.76	23.42	53.18	74.00	-20.82	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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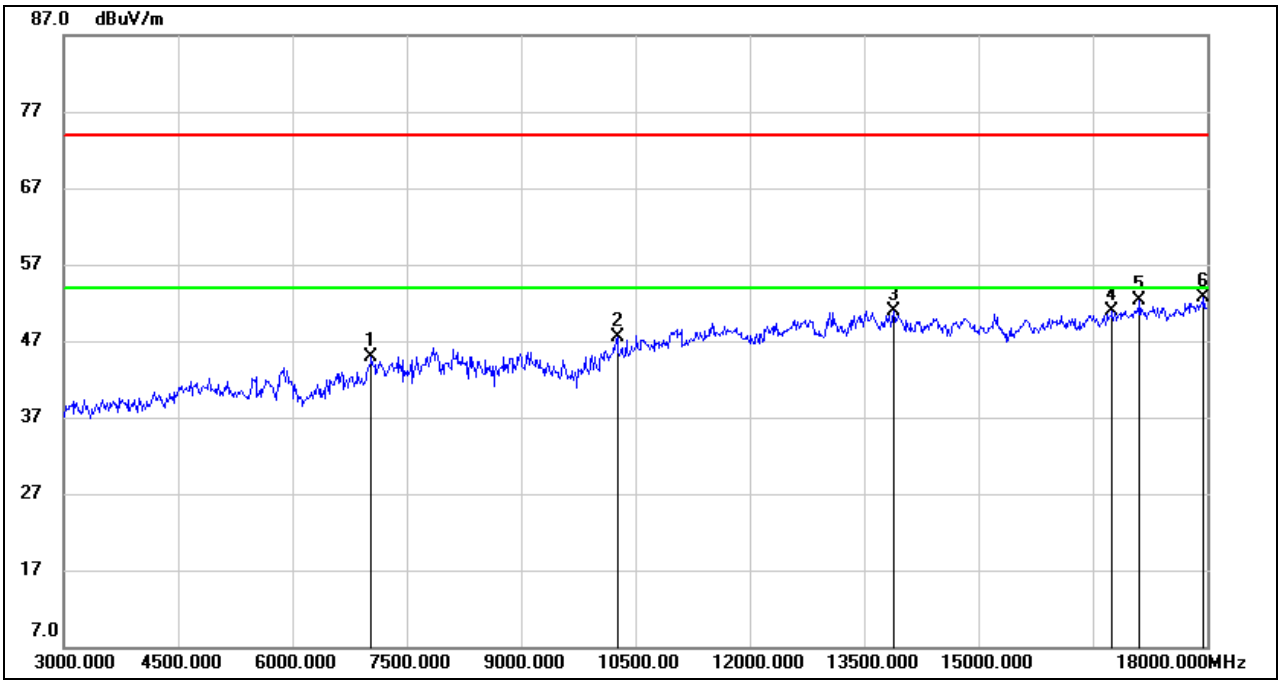
8.3.2. LE 2M MODE

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	7035.000	39.06	5.81	44.87	74.00	-29.13	peak
2	10260.000	36.74	10.71	47.45	74.00	-26.55	peak
3	13890.000	34.51	16.31	50.82	74.00	-23.18	peak
4	16755.000	31.05	19.94	50.99	74.00	-23.01	peak
5	17115.000	31.65	20.68	52.33	74.00	-21.67	peak
6	17955.000	29.32	23.41	52.73	74.00	-21.27	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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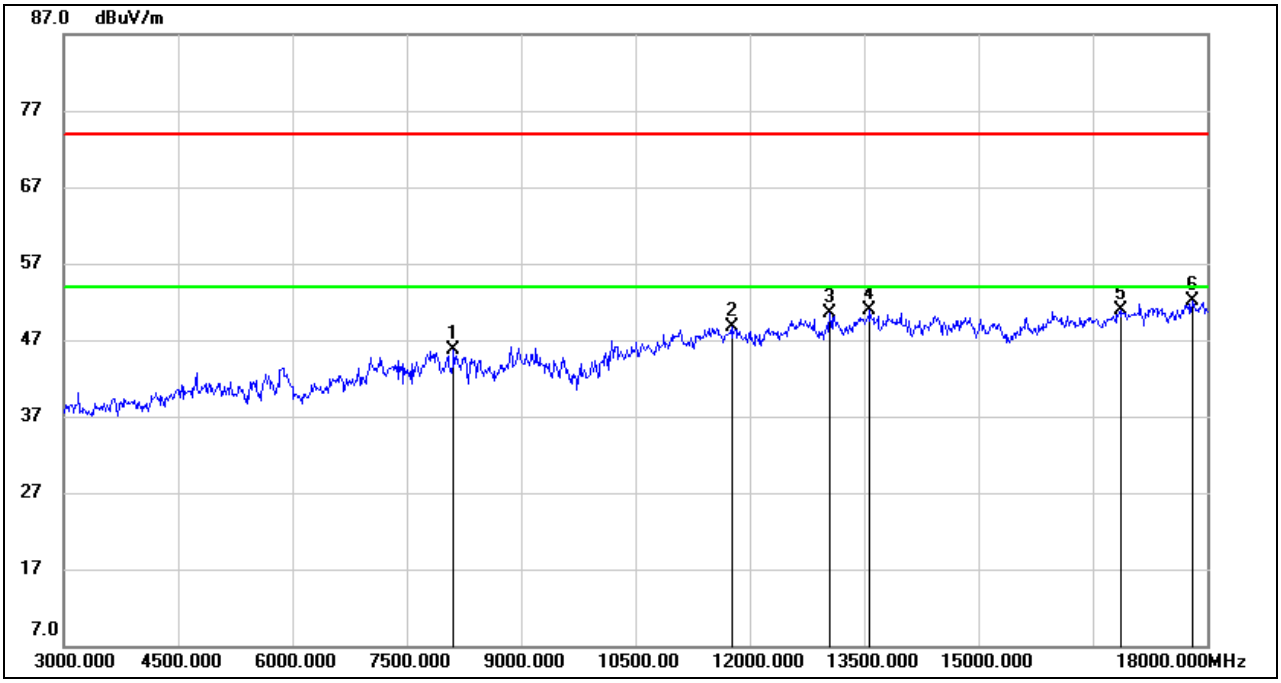
HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	8115.000	37.72	7.90	45.62	74.00	-28.38	peak
2	11760.000	35.71	13.09	48.80	74.00	-25.20	peak
3	13050.000	35.46	15.07	50.53	74.00	-23.47	peak
4	13575.000	34.99	15.97	50.96	74.00	-23.04	peak
5	16860.000	30.89	19.95	50.84	74.00	-23.16	peak
6	17805.000	28.75	23.31	52.06	74.00	-21.94	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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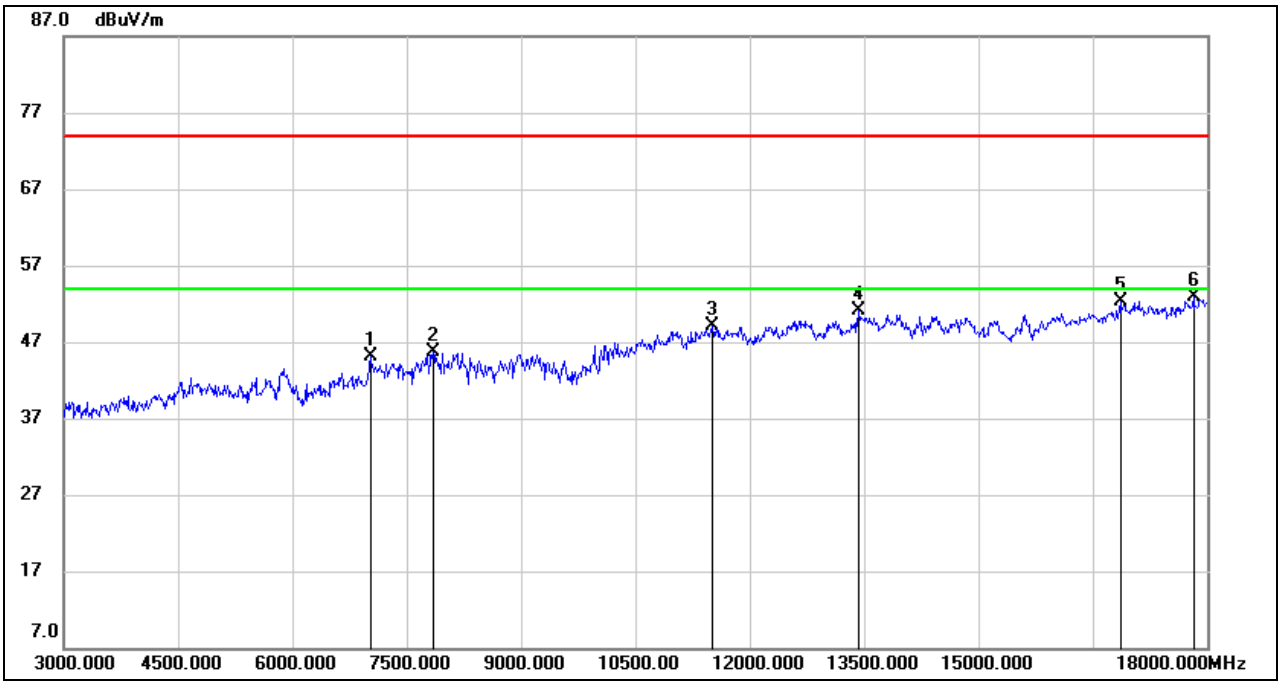
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	7020.000	39.38	5.78	45.16	74.00	-28.84	peak
2	7845.000	38.00	7.62	45.62	74.00	-28.38	peak
3	11505.000	35.60	13.42	49.02	74.00	-24.98	peak
4	13425.000	35.08	16.02	51.10	74.00	-22.90	peak
5	16860.000	32.26	19.95	52.21	74.00	-21.79	peak
6	17820.000	29.57	23.30	52.87	74.00	-21.13	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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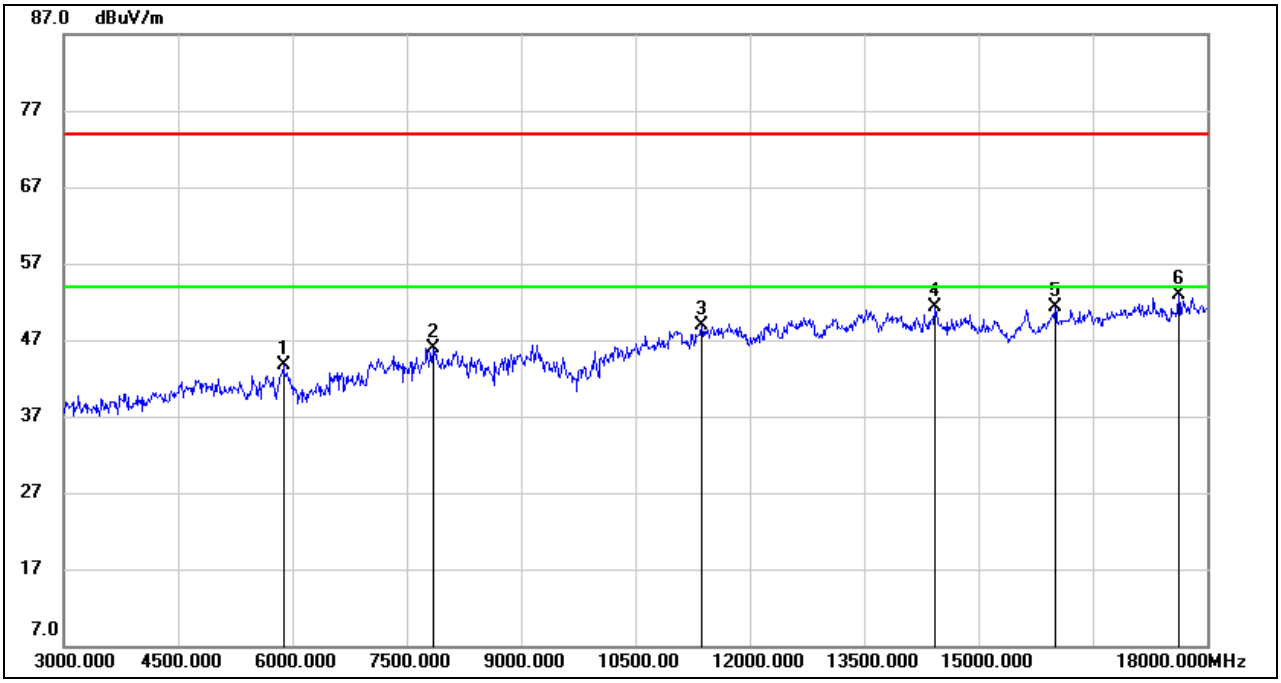
HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5880.000	39.18	4.59	43.77	74.00	-30.23	peak
2	7845.000	38.34	7.62	45.96	74.00	-28.04	peak
3	11370.000	36.37	12.54	48.91	74.00	-25.09	peak
4	14430.000	34.95	16.35	51.30	74.00	-22.70	peak
5	16005.000	33.56	17.71	51.27	74.00	-22.73	peak
6	17625.000	30.94	21.95	52.89	74.00	-21.11	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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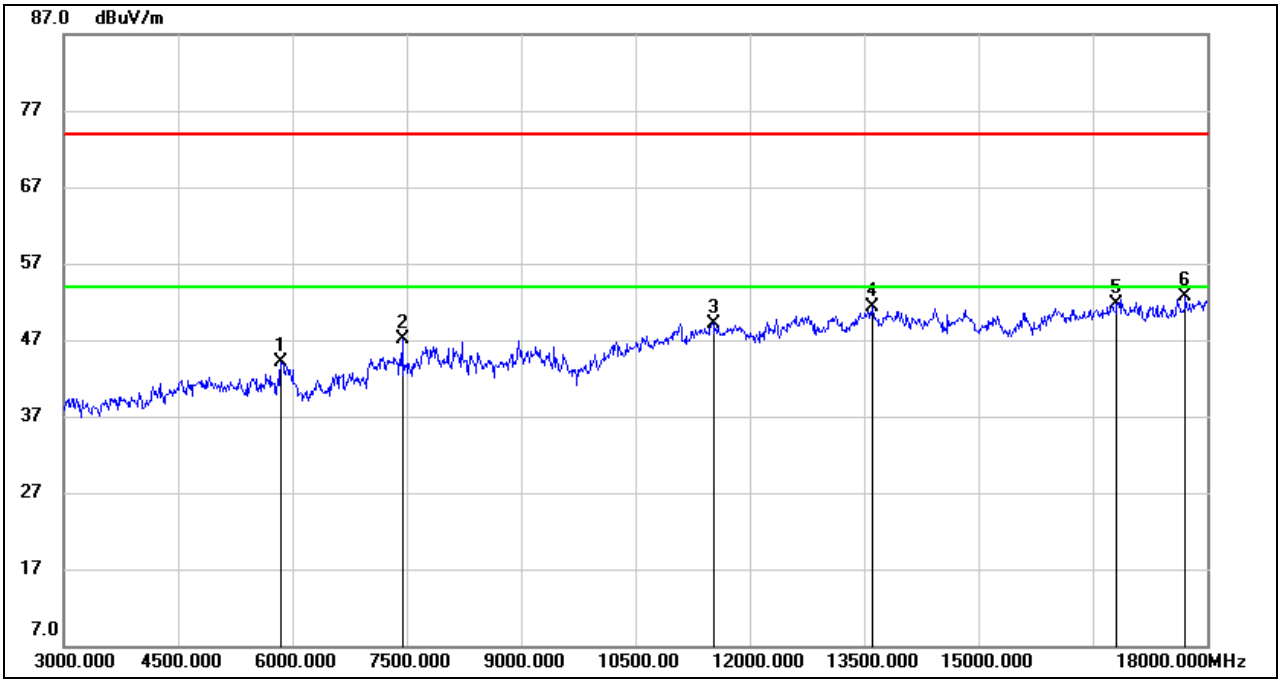
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5850.000	40.16	4.02	44.18	74.00	-29.82	peak
2	7440.000	40.70	6.32	47.02	74.00	-26.98	peak
3	11520.000	35.82	13.38	49.20	74.00	-24.80	peak
4	13605.000	35.33	16.02	51.35	74.00	-22.65	peak
5	16815.000	31.78	19.96	51.74	74.00	-22.26	peak
6	17715.000	30.10	22.56	52.66	74.00	-21.34	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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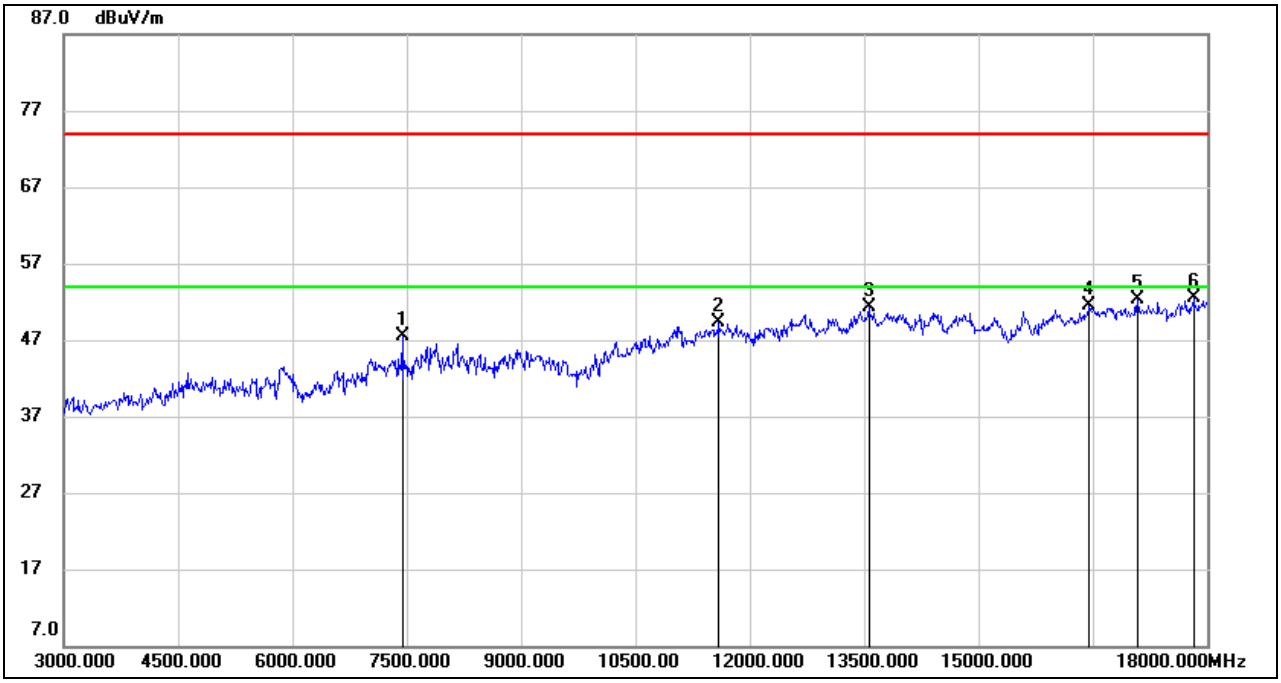
HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	7440.000	41.09	6.32	47.41	74.00	-26.59	peak
2	11595.000	36.05	13.19	49.24	74.00	-24.76	peak
3	13560.000	35.44	15.93	51.37	74.00	-22.63	peak
4	16455.000	32.50	19.00	51.50	74.00	-22.50	peak
5	17085.000	31.63	20.60	52.23	74.00	-21.77	peak
6	17820.000	29.25	23.30	52.55	74.00	-21.45	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.
5. Proper operation of the transmitter prior to adding the filter to the measurement chain.

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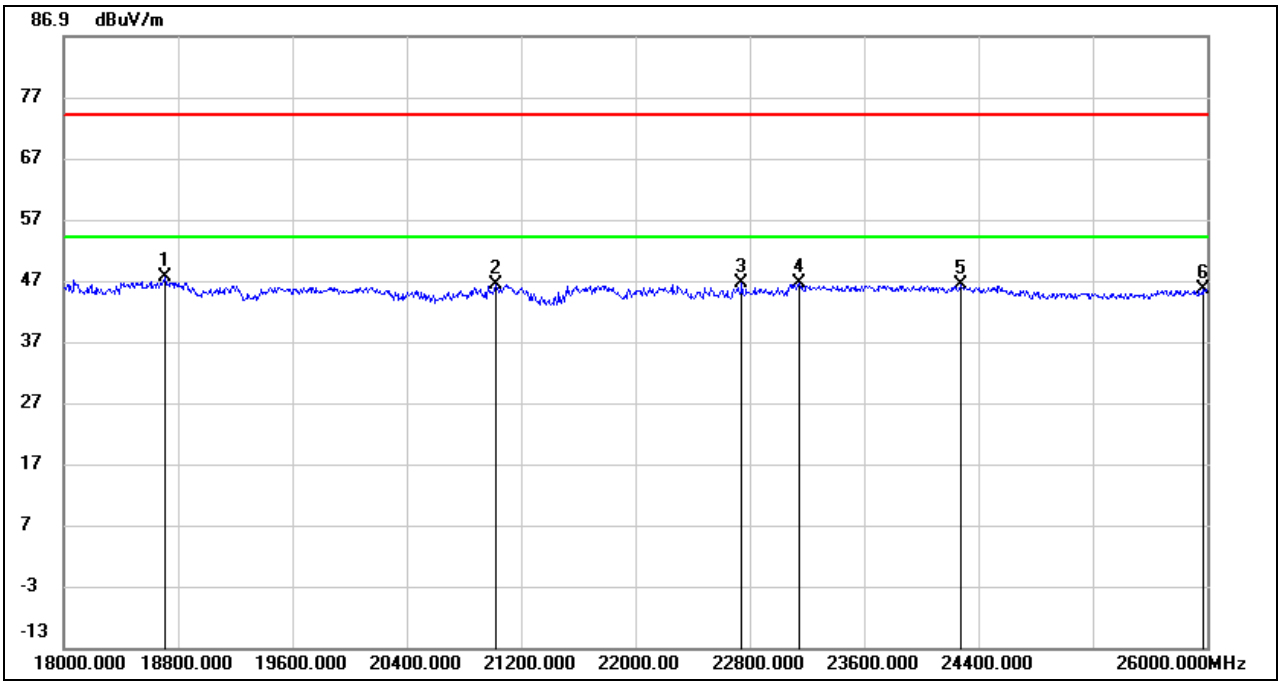
8.4. SPURIOUS EMISSIONS (18 GHz ~ 26 GHz)

8.4.1. LE 2M MODE

SPURIOUS EMISSIONS (HIGH CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	18712.000	52.23	-4.76	47.47	74.00	-26.53	peak
2	21024.000	51.62	-5.30	46.32	74.00	-27.68	peak
3	22744.000	52.18	-5.74	46.44	74.00	-27.56	peak
4	23144.000	51.87	-5.40	46.47	74.00	-27.53	peak
5	24272.000	49.68	-3.51	46.17	74.00	-27.83	peak
6	25968.000	47.91	-2.31	45.60	74.00	-28.40	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. The preamplifier only effect to the above 18GHz signal and no filter added to the measurement chain.

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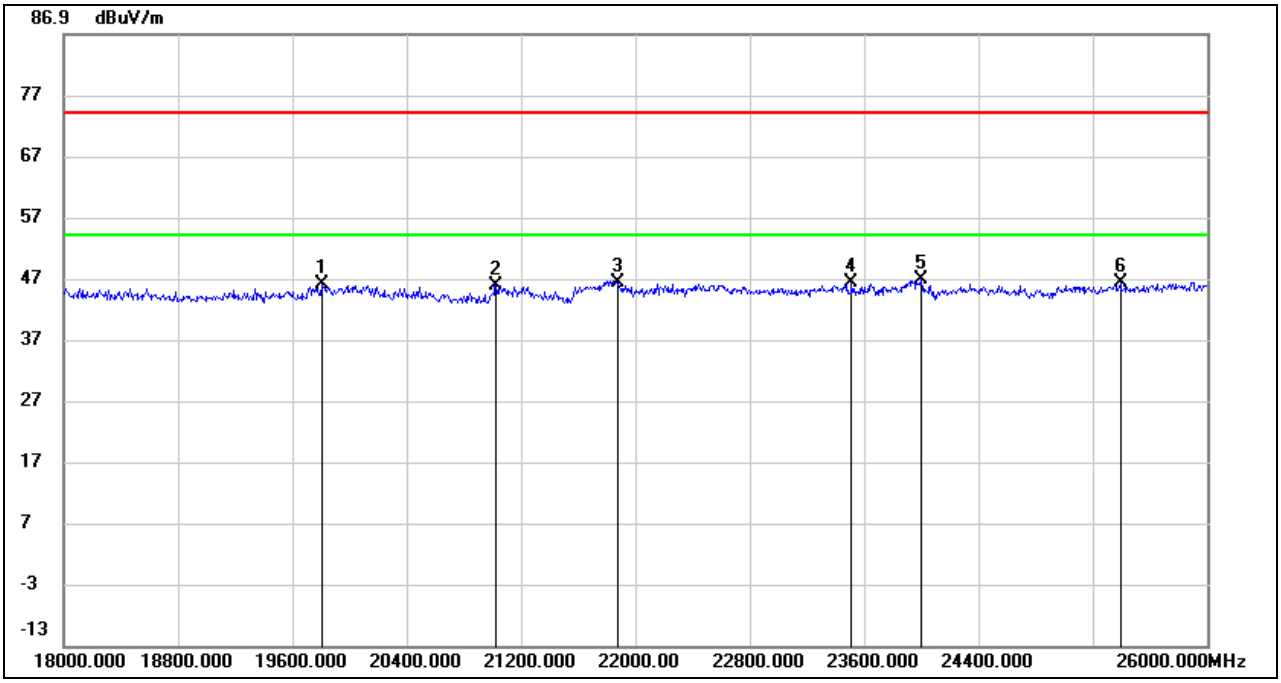
SPURIOUS EMISSIONS (HIGH CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	19808.000	50.33	-4.34	45.99	74.00	-28.01	peak
2	21024.000	51.14	-5.30	45.84	74.00	-28.16	peak
3	21872.000	52.30	-5.99	46.31	74.00	-27.69	peak
4	23512.000	51.01	-4.76	46.25	74.00	-27.75	peak
5	24000.000	50.91	-4.01	46.90	74.00	-27.10	peak
6	25392.000	47.82	-1.55	46.27	74.00	-27.73	peak

Note: 1. Peak Result = Reading Level + Correct Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Peak: Peak detector.
4. The preamplifier only effect to the above 18GHz signal and no filter added to the measurement chain.

Note: All the modes have been tested, only the worst data was recorded in the report.

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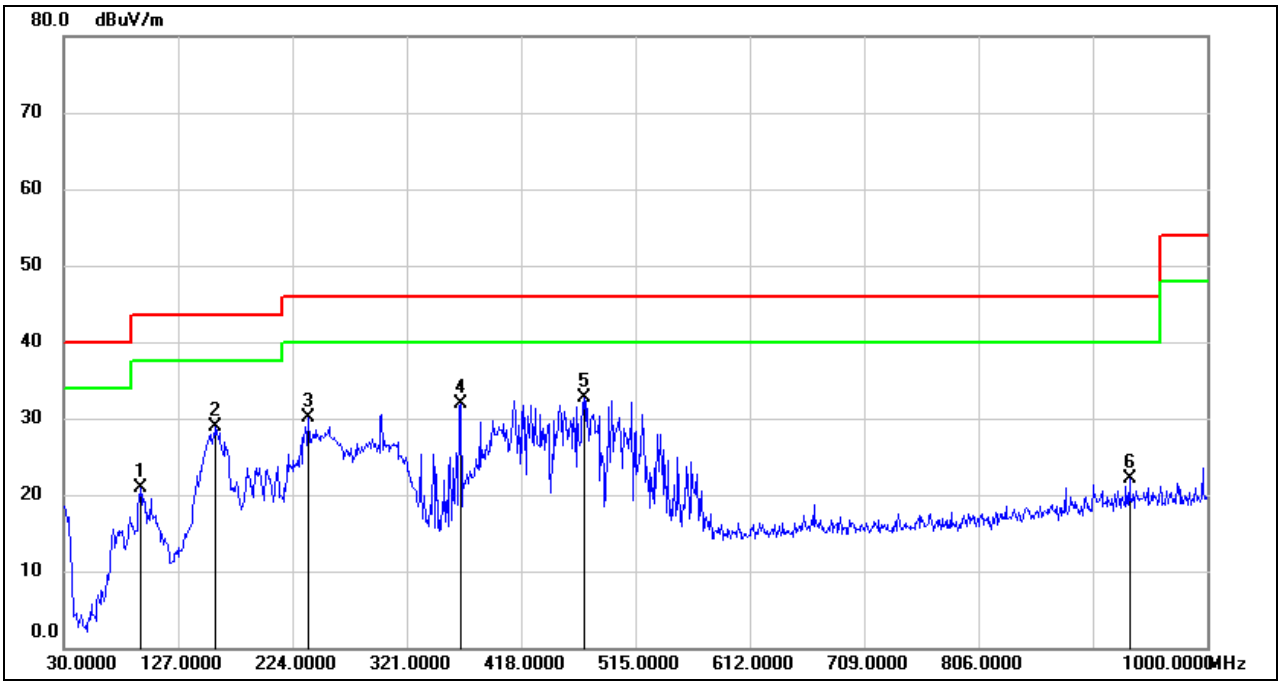
8.5. SPURIOUS EMISSIONS (30 MHz ~ 1 GHz)

8.5.1. LE 2M MODE

SPURIOUS EMISSIONS (HIGH CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	94.9900	42.56	-21.64	20.92	43.50	-22.58	QP
2	159.0100	46.86	-18.05	28.81	43.50	-14.69	QP
3	237.5800	49.41	-19.29	30.12	46.00	-15.88	QP
4	366.5900	46.14	-14.14	32.00	46.00	-14.00	QP
5	471.3500	44.81	-12.02	32.79	46.00	-13.21	QP
6	934.0400	27.54	-5.37	22.17	46.00	-23.83	QP

Note: 1. Result Level = Read Level + Correct Factor.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

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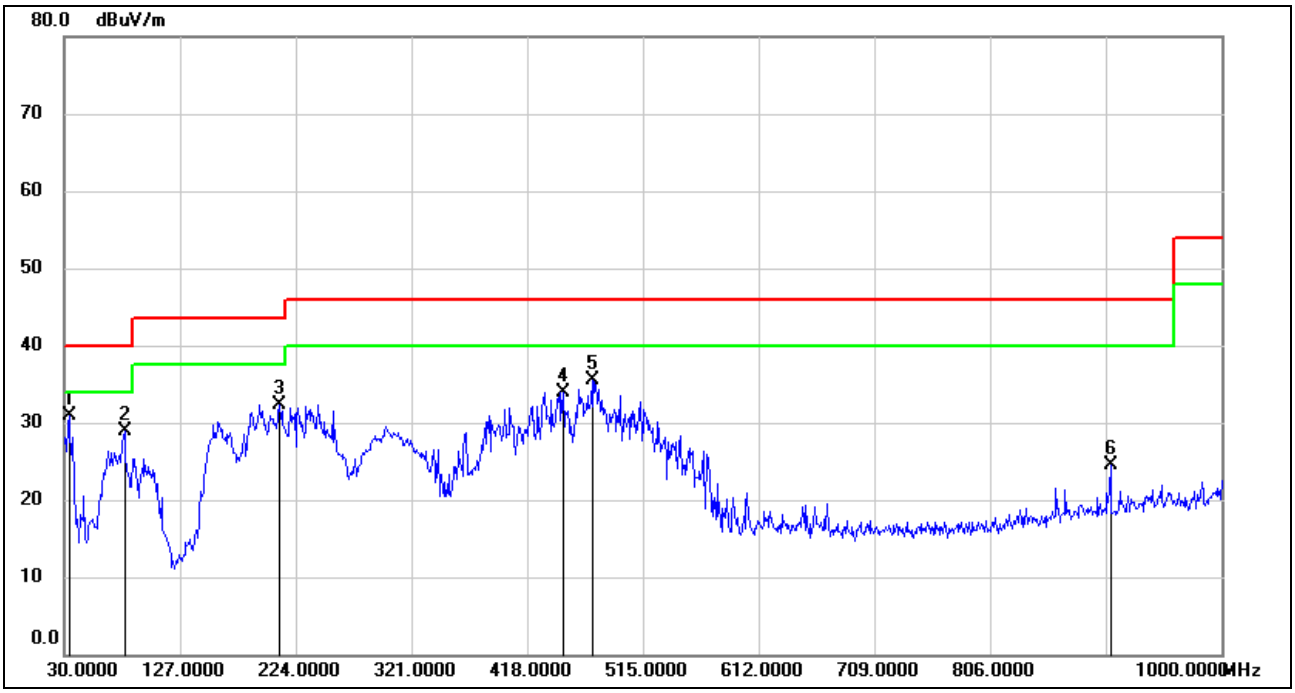
SPURIOUS EMISSIONS (HIGH CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	33.8800	50.29	-19.38	30.91	40.00	-9.09	QP
2	80.4400	50.51	-21.53	28.98	40.00	-11.02	QP
3	210.4200	49.88	-17.57	32.31	43.50	-11.19	QP
4	448.0700	46.50	-12.50	34.00	46.00	-12.00	QP
5	472.3200	47.56	-12.01	35.55	46.00	-10.45	QP
6	906.8800	30.17	-5.58	24.59	46.00	-21.41	QP

Note: 1. Result Level = Read Level + Correct Factor.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

Note: All the modes have been tested, only the worst data was recorded in the report.

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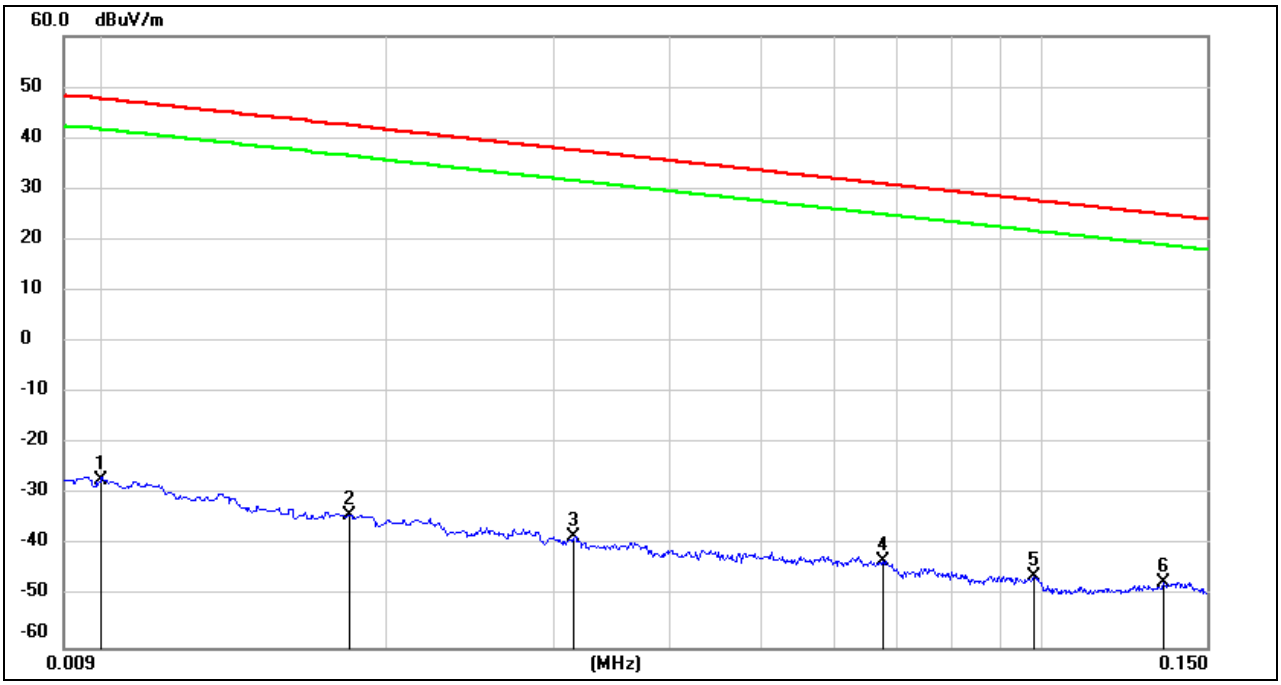
8.6. SPURIOUS EMISSIONS BELOW 30 MHz

8.6.1. LE 2M MODE

SPURIOUS EMISSIONS (HIGH CHANNEL, LOOP ANTENNA FACE ON TO THE EUT, WORST-CASE CONFIGURATION)

9kHz~ 150kHz



No.	Frequency	Reading	Correct	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.0100	74.22	-101.40	-27.18	47.60	-78.68	-3.90	-74.78	peak
2	0.0182	67.35	-101.36	-34.01	42.40	-85.51	-9.10	-76.41	peak
3	0.0316	63.24	-101.40	-38.16	37.61	-89.66	-13.89	-75.77	peak
4	0.0675	58.64	-101.56	-42.92	31.02	-94.42	-20.48	-73.94	peak
5	0.0981	55.77	-101.78	-46.01	27.77	-97.51	-23.73	-73.78	peak
6	0.1348	54.41	-101.68	-47.27	25.01	-98.77	-26.49	-72.28	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

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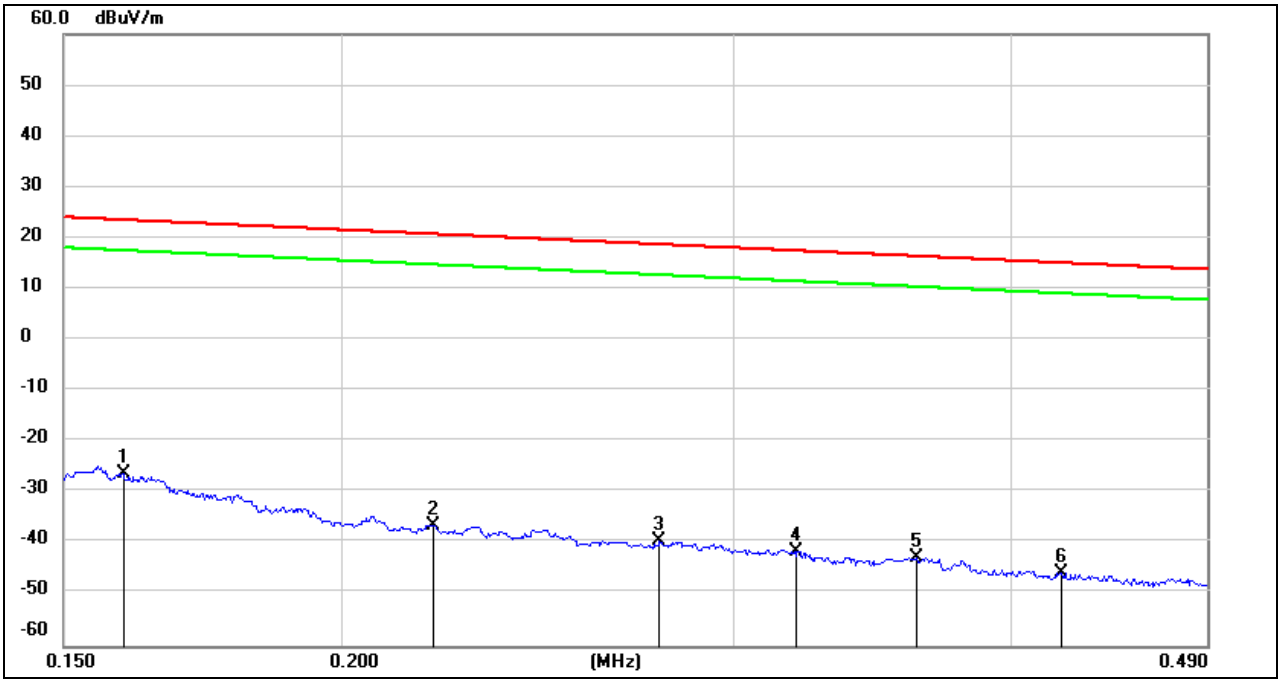
150kHz ~ 490kHz



No.	Frequency	Reading	Correct	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.1595	75.36	-101.65	-26.29	23.55	-77.79	-27.95	-49.84	peak
2	0.2200	65.24	-101.75	-36.51	20.75	-88.01	-30.75	-57.26	peak
3	0.2782	62.29	-101.83	-39.54	18.71	-91.04	-32.79	-58.25	peak
4	0.3204	60.47	-101.88	-41.41	17.49	-92.91	-34.01	-58.90	peak
5	0.3628	59.10	-101.93	-42.83	16.41	-94.33	-35.09	-59.24	peak
6	0.4218	56.37	-101.98	-45.61	15.10	-97.11	-36.40	-60.71	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

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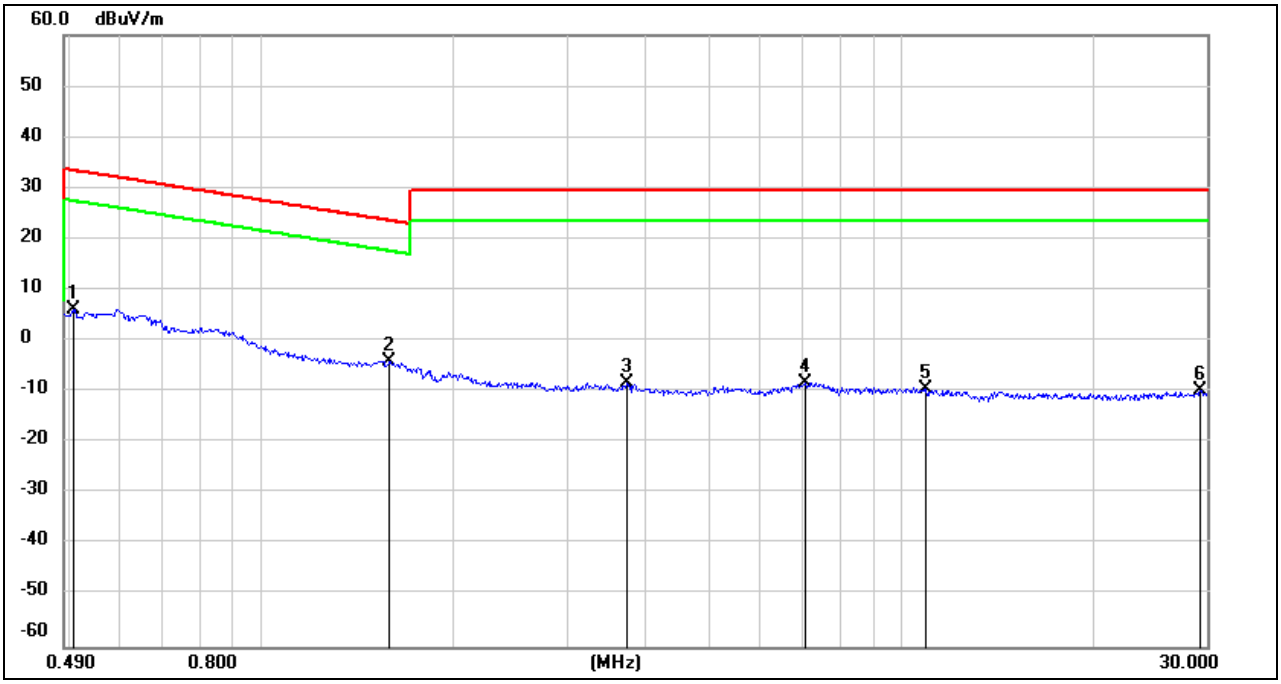
490kHz ~ 30MHz



No.	Frequency	Reading	Correct	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.5080	68.35	-62.07	6.28	33.49	-45.22	-18.01	-27.21	peak
2	1.5826	57.88	-62.01	-4.13	23.61	-55.63	-27.89	-27.74	peak
3	3.7100	53.20	-61.41	-8.21	29.54	-59.71	-21.96	-37.75	peak
4	7.1002	53.01	-61.21	-8.20	29.54	-59.70	-21.96	-37.74	peak
5	10.9365	51.50	-60.84	-9.34	29.54	-60.84	-21.96	-38.88	peak
6	29.3213	50.30	-60.02	-9.72	29.54	-61.22	-21.96	-39.26	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

Note: All the modes have been tested, only the worst data was recorded in the report.

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9. AC POWER LINE CONDUCTED EMISSIONS

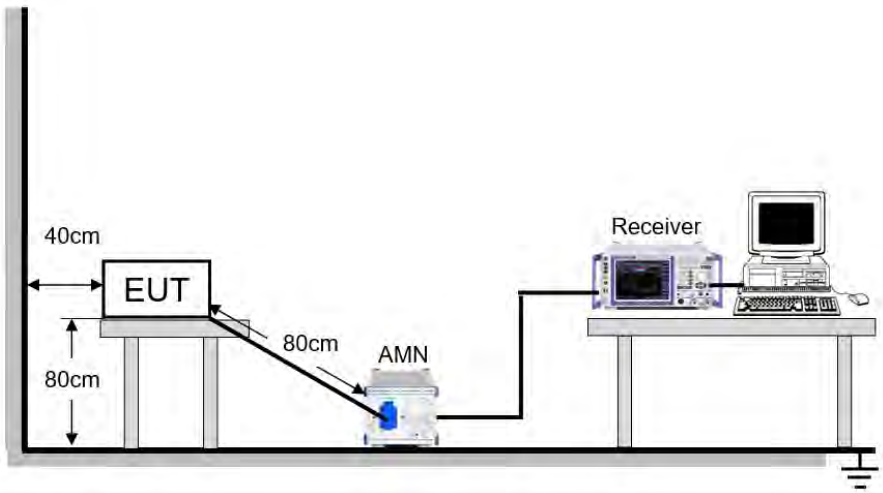
LIMITS

Please refer to CFR 47 FCC §15.207 (a) and ISED RSS-Gen Clause 8.8

FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

TEST SETUP AND PROCEDURE

Refer to ANSI C63.10-2013 clause 6.2.



The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST ENVIRONMENT

Temperature	25 °C	Relative Humidity	72.1 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 11.55 V

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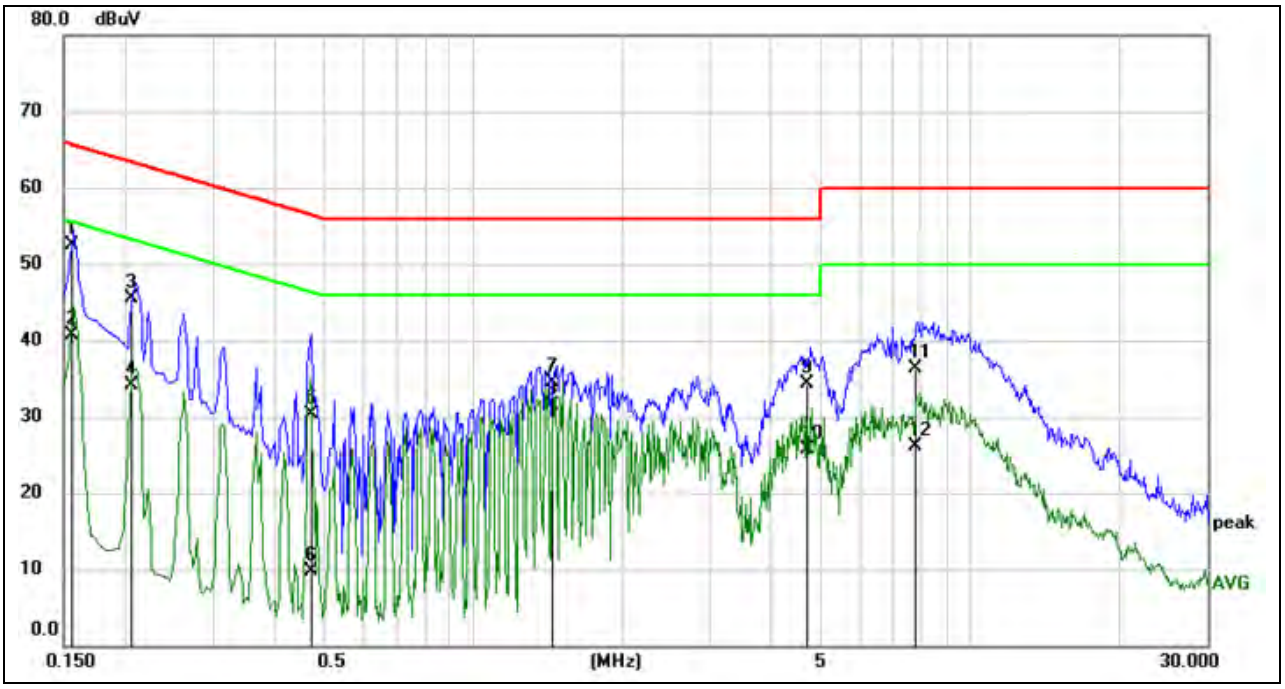
RESULTS

9.1. LE 2M MODE

LINE L RESULTS (LOW CHANNEL, WORST-CASE CONFIGURATION)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1553	42.90	9.61	52.51	65.71	-13.20	QP
2	0.1553	31.14	9.61	40.75	55.71	-14.96	AVG
3	0.2056	35.94	9.60	45.54	63.38	-17.84	QP
4	0.2056	24.58	9.60	34.18	53.38	-19.20	AVG
5	0.4758	20.66	9.60	30.26	56.41	-26.15	QP
6	0.4758	0.17	9.60	9.77	46.41	-36.64	AVG
7	1.4408	24.95	9.61	34.56	56.00	-21.44	QP
8	1.4408	21.81	9.61	31.42	46.00	-14.58	AVG
9	4.7194	24.61	9.67	34.28	56.00	-21.72	QP
10	4.7194	16.02	9.67	25.69	46.00	-20.31	AVG
11	7.7414	26.63	9.71	36.34	60.00	-23.66	QP
12	7.7414	16.36	9.71	26.07	50.00	-23.93	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009 MHz-0.15 MHz), 4 kHz (0.15 MHz-30 MHz), Scan time: auto.

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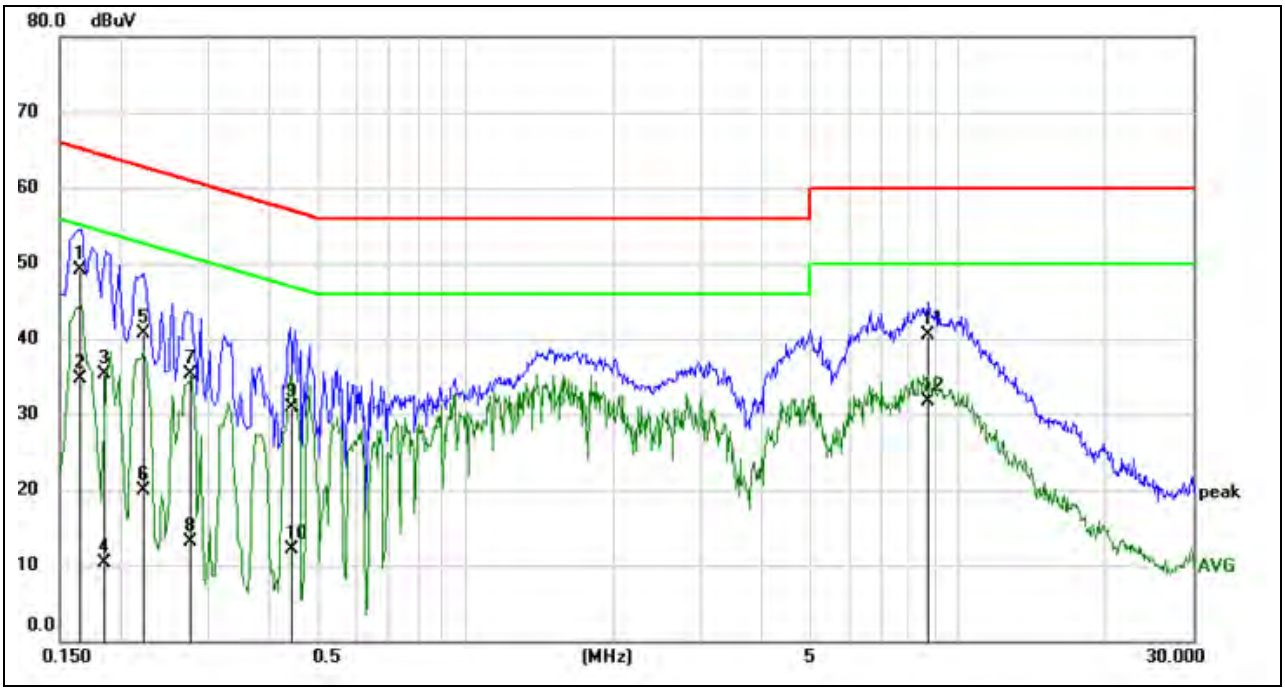
LINE N RESULTS (LOW CHANNEL, WORST-CASE CONFIGURATION)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1649	39.47	9.60	49.07	65.21	-16.14	QP
2	0.1649	25.09	9.60	34.69	55.21	-20.52	AVG
3	0.1841	25.73	9.60	35.33	64.30	-28.97	QP
4	0.1841	0.72	9.60	10.32	54.30	-43.98	AVG
5	0.2211	31.16	9.60	40.76	62.78	-22.02	QP
6	0.2211	10.34	9.60	19.94	52.78	-32.84	AVG
7	0.2779	25.66	9.60	35.26	60.88	-25.62	QP
8	0.2779	3.50	9.60	13.10	50.88	-37.78	AVG
9	0.4433	21.33	9.60	30.93	57.00	-26.07	QP
10	0.4433	2.55	9.60	12.15	47.00	-34.85	AVG
11	8.6701	30.69	9.74	40.43	60.00	-19.57	QP
12	8.6701	22.06	9.74	31.80	50.00	-18.20	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009 MHz-0.15 MHz), 4 kHz (0.15 MHz-30 MHz), Scan time: auto.

Note: All the modes have been tested, only the worst data was recorded in the report.

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10. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RESULTS

Complies

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Appendix A: 6dB DTS Bandwidth

Test Result

Test Mode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
LE	Ant2	2402	0.640	2401.672	2402.312	0.5	PASS
		2440	0.644	2439.668	2440.312	0.5	PASS
		2480	0.680	2479.656	2480.336	0.5	PASS
LE 2M	Ant2	2402	1.136	2401.432	2402.568	0.5	PASS
		2440	1.124	2439.432	2440.556	0.5	PASS
		2480	1.116	2479.428	2480.544	0.5	PASS

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Test Graphs

LE_Ant2_2402

LE_Ant2_2440

LE_Ant2_2480

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LE 2M_Ant2_2402

LE 2M_Ant2_2440

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LE 2M_Ant2_2480

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Appendix B: Occupied Channel Bandwidth

Test Result

Test Mode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
LE	Ant2	2402	1.0372	2401.478	2402.515	---	PASS
		2440	1.0348	2439.473	2440.507	---	PASS
		2480	1.0300	2479.481	2480.511	---	PASS
LE 2M	Ant2	2402	2.0492	2400.988	2403.037	---	PASS
		2440	2.0538	2438.978	2441.032	---	PASS
		2480	2.0484	2478.985	2481.033	---	PASS

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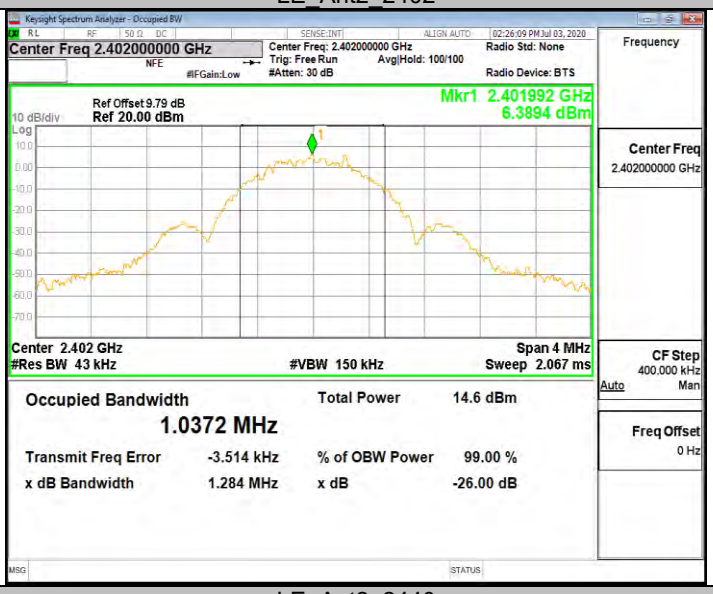
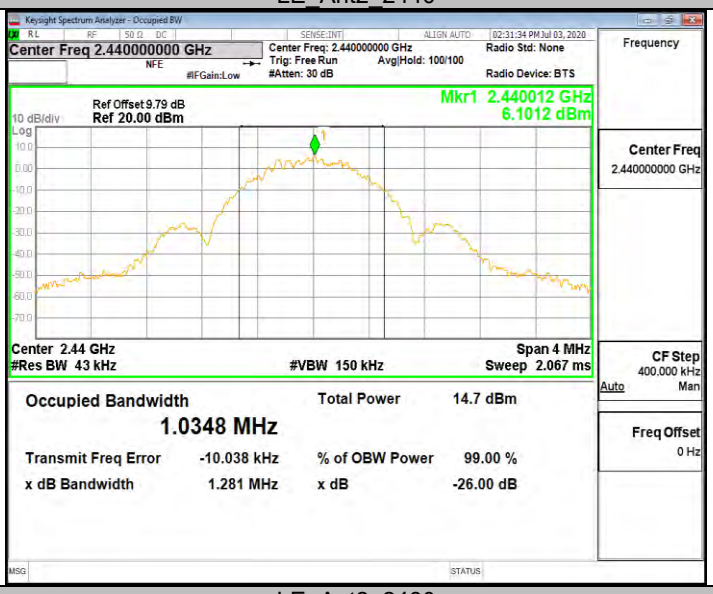
Test Graphs

LE_Ant2_2402



LE_Ant2_2440



LE_Ant2_2480

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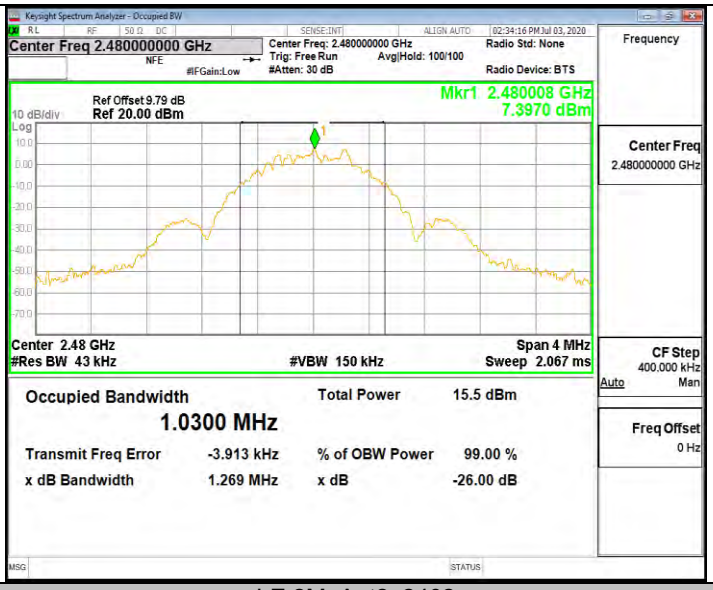
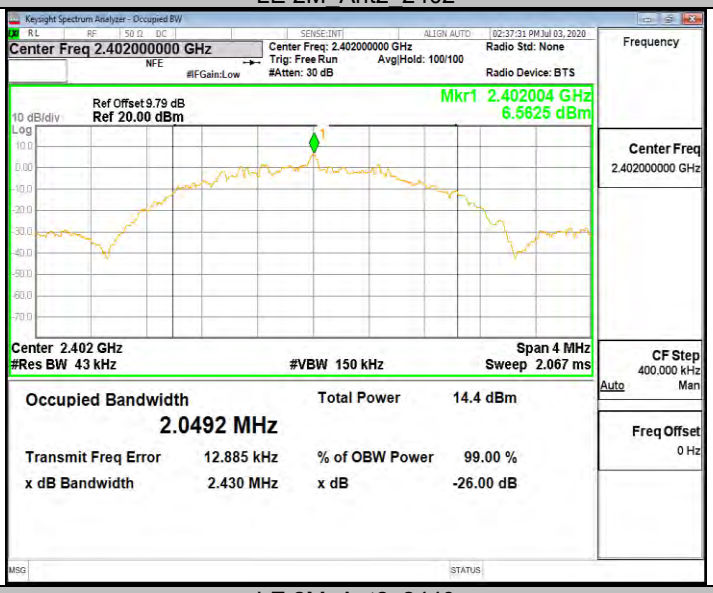
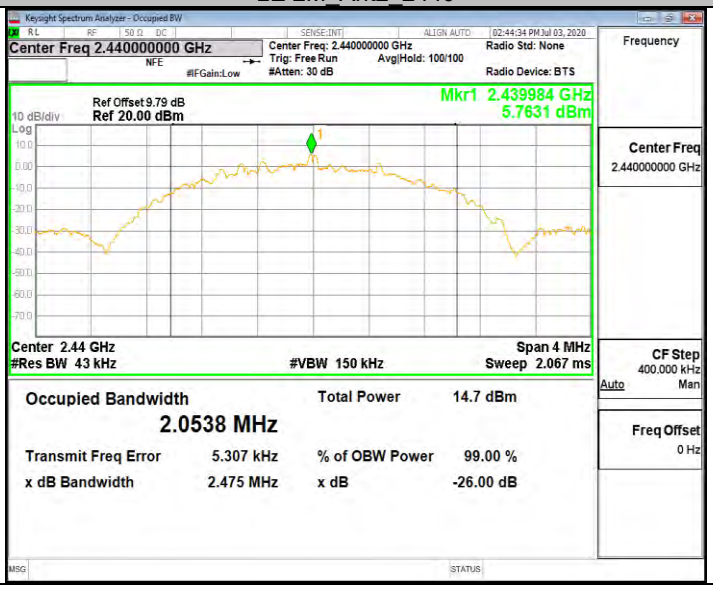


LE 2M_Ant2_2402



LE 2M_Ant2_2440



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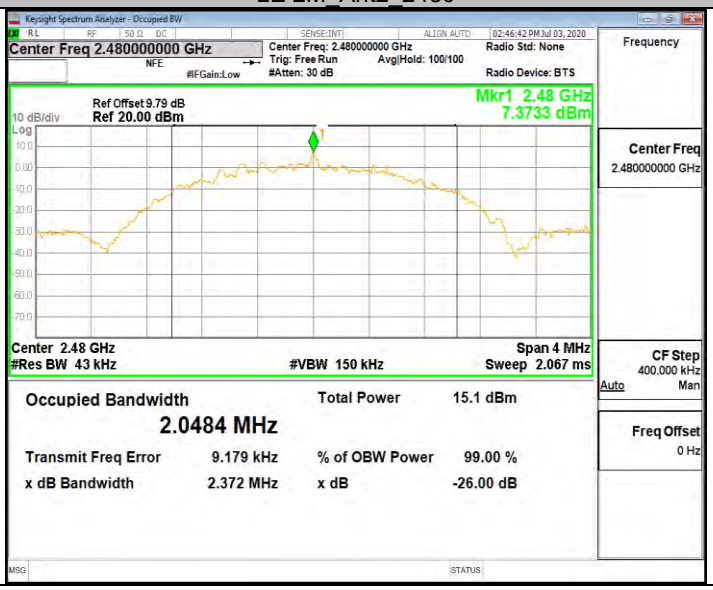
LE 2M_Ant2_2480



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Appendix C: Maximum Output Power

Test Result

Mode	Channel	Peak Power	AVG Power	Average EIRP	Conducted Power Limit	ISED EIRP Limit
LE	0	7.86	6.38	8.75	30	36
	19	8.26	6.79	9.16	30	36
	39	8.89	7.42	9.79	30	36
LE 2M	0	7.88	5.35	7.72	30	36
	19	8.29	5.75	8.12	30	36
	39	8.91	6.37	8.74	30	36

Note: 1. Both antenna 1 and antenna 2 had been tested, only the worst data (antenna 2) was recorded in the report.

2. Average EIRP = Average Conducted Output Power + Antenna gain.

3. The test results have already included the duty cycle correction factor. About correction Factor please refer to section 7.1.

4. Only the worst EIRP data was recorded in the report, for more about the antenna gain, please refer to clause 5.6.

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Appendix D: Maximum Power Spectral Density

Test Result

Test Mode	Antenna	Channel	Result [dBm/3-100 kHz]	Limit [dBm/3 kHz]	Verdict
LE	Ant2	2402	-7.3	<=8	PASS
		2440	-7.3	<=8	PASS
		2480	-7.34	<=8	PASS
LE 2M	Ant2	2402	-9.94	<=8	PASS
		2440	-9.71	<=8	PASS
		2480	-8.82	<=8	PASS

Note: Both antenna 1 and antenna 2 had been tested, only the worst data (antenna 2) was recorded in the report.

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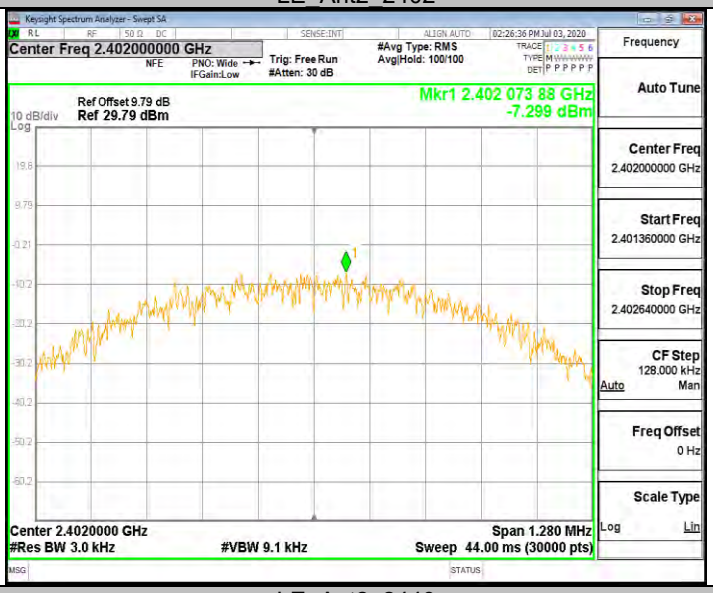
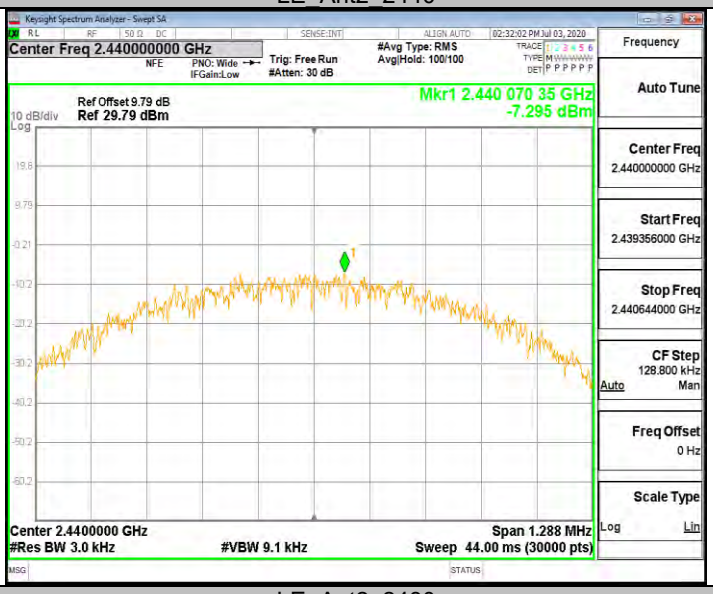
Test Graphs

LE_Ant2_2402



LE_Ant2_2440



LE_Ant2_2480

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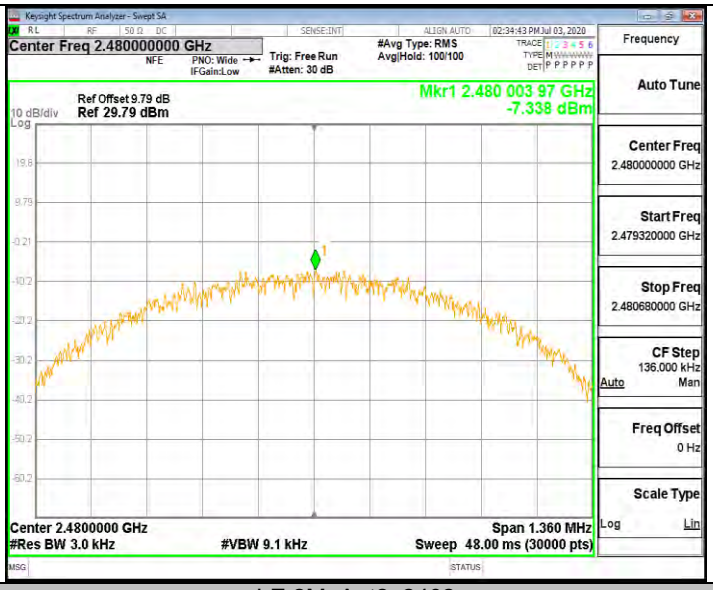
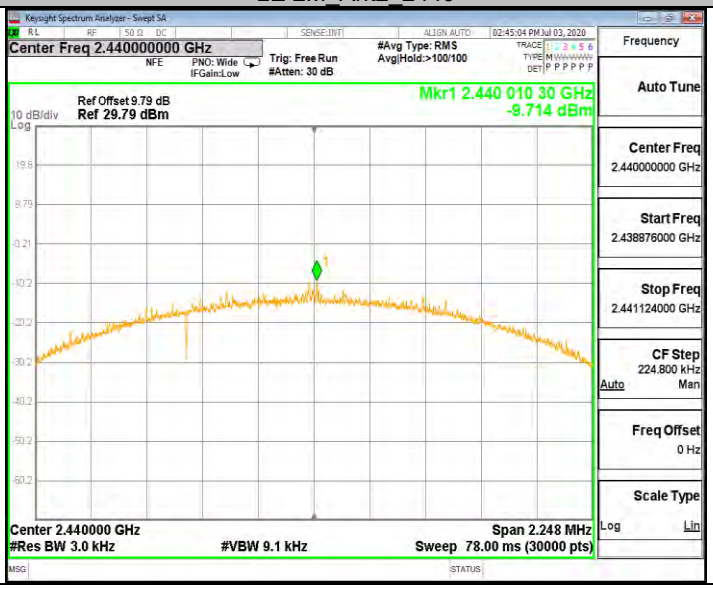


LE 2M_Ant2_2402

LE 2M_Ant2_2440



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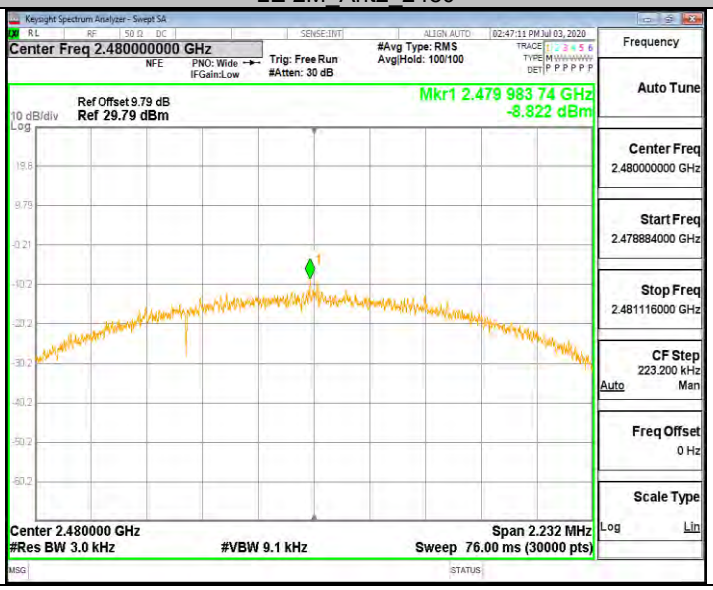
LE 2M_Ant2_2480



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Appendix E: Conducted Band Edge Measurements

Test Result

Test Mode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
LE	Ant2	Low	2402	7.93	-48.9	<=-12.08	PASS
		High	2480	8.10	-42.32	<=-11.9	PASS
LE 2M	Ant2	Low	2402	7.73	-26.25	<=-12.27	PASS
		High	2480	8.51	-46.71	<=-11.49	PASS

Note: Both antenna 1 and antenna 2 had been tested, only the worst data (antenna 2) was recorded in the report.

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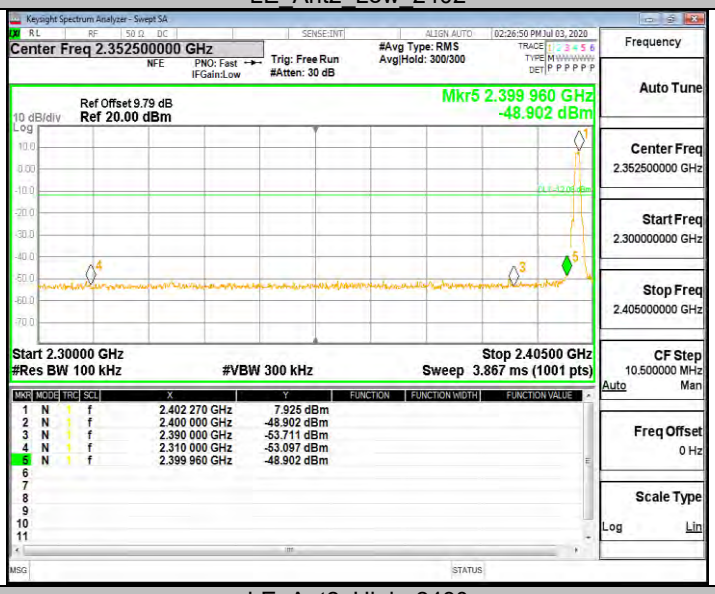
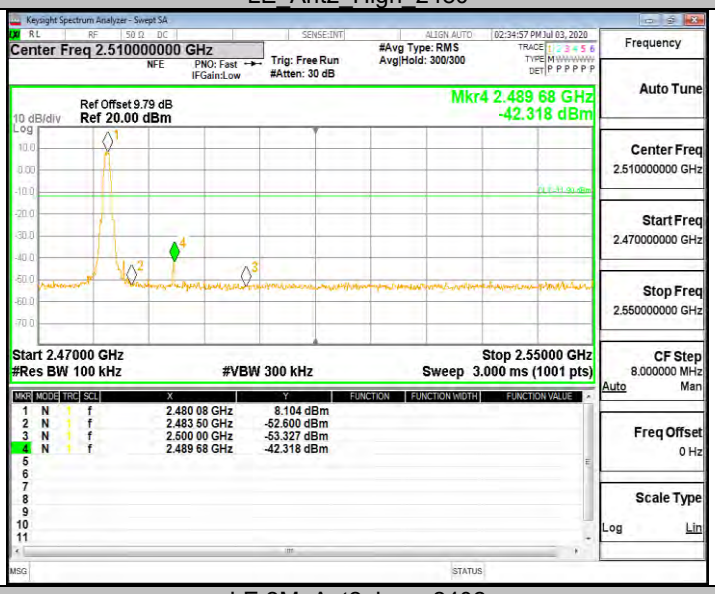
Test Graphs

LE_Ant2_Low_2402



LE_Ant2_High_2480



LE 2M_Ant2_Low_2402

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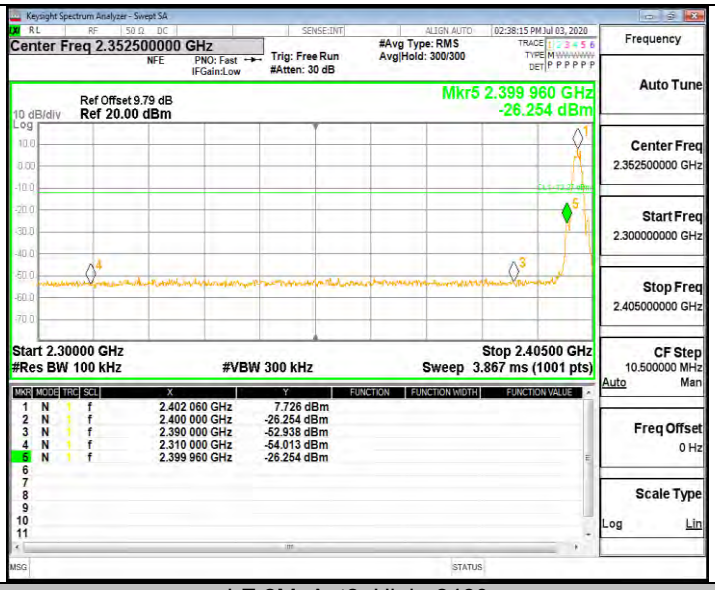
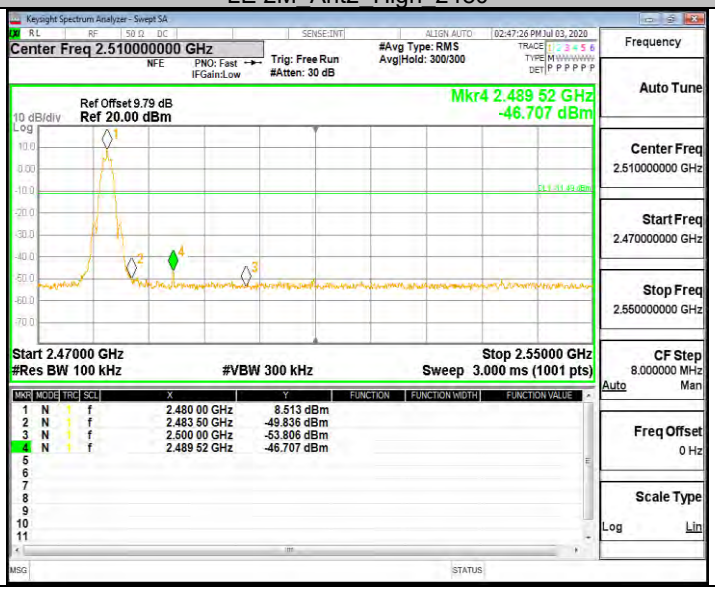


LE 2M_Ant2_High_2480



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Appendix F: Conducted Spurious Emission

Test Result

Test Mode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
LE	Ant2	2402	Reference	7.81	7.81	---	PASS
			30~1000	30~1000	-72.239	<=-12.194	PASS
			1000~26500	1000~26500	-52.594	<=-12.194	PASS
		2440	Reference	8.20	8.20	---	PASS
			30~1000	30~1000	-73.208	<=-11.804	PASS
			1000~26500	1000~26500	-51.445	<=-11.804	PASS
		2480	Reference	8.57	8.57	---	PASS
			30~1000	30~1000	-72.588	<=-11.426	PASS
			1000~26500	1000~26500	-44.341	<=-11.426	PASS
LE 2M	Ant2	2402	Reference	7.14	7.14	---	PASS
			30~1000	30~1000	-72.855	<=-12.861	PASS
			1000~26500	1000~26500	-26.97	<=-12.861	PASS
		2440	Reference	7.70	7.70	---	PASS
			30~1000	30~1000	-72.785	<=-12.298	PASS
			1000~26500	1000~26500	-54.478	<=-12.298	PASS
		2480	Reference	8.52	8.52	---	PASS
			30~1000	30~1000	-73.212	<=-11.477	PASS
			1000~26500	1000~26500	-54.168	<=-11.477	PASS

Note: Both antenna 1 and antenna 2 had been tested, only the worst data (antenna 2) was recorded in the report.

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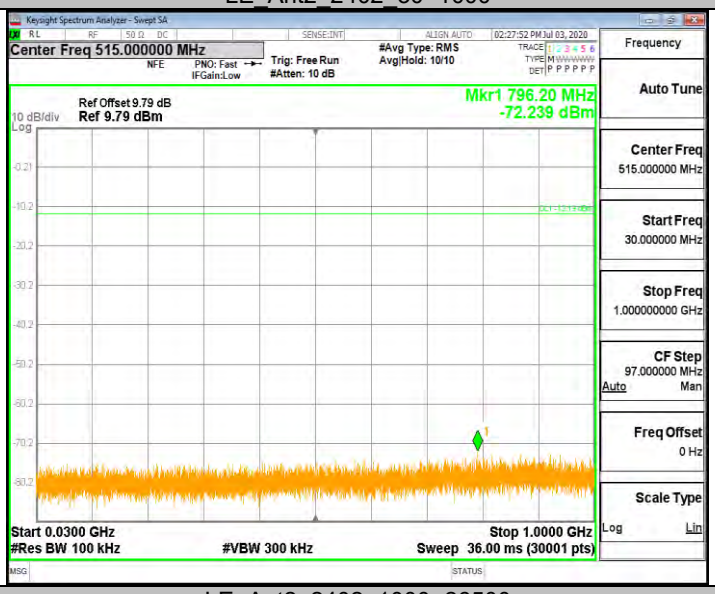
Test Graphs

LE_Ant2_2402_0~Reference

LE_Ant2_2402_30~1000



LE_Ant2_2402_1000~26500

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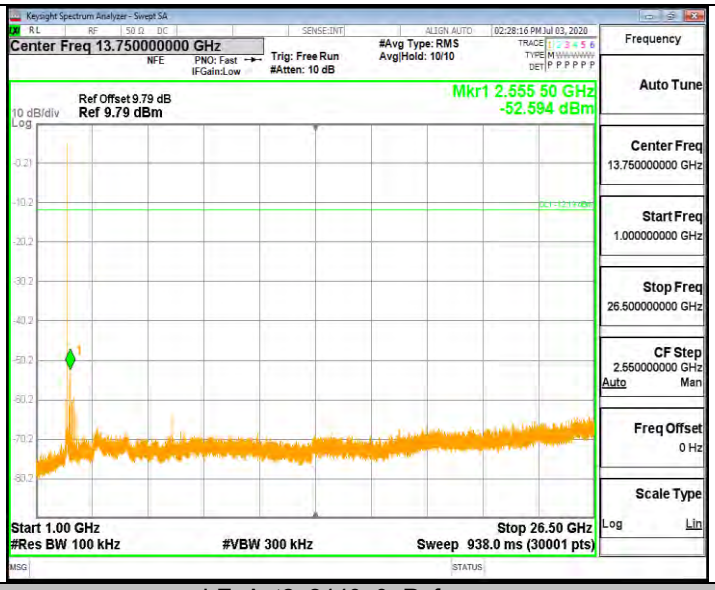
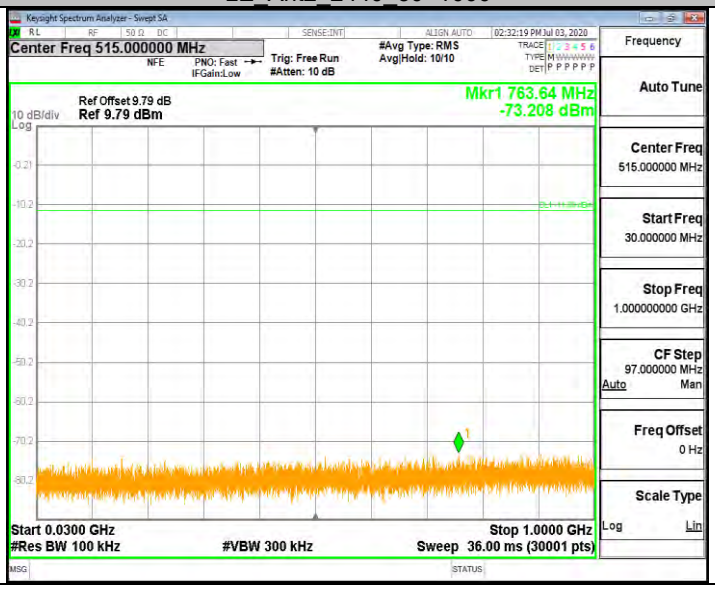


LE_Ant2_2440_0~Reference

LE_Ant2_2440_30~1000



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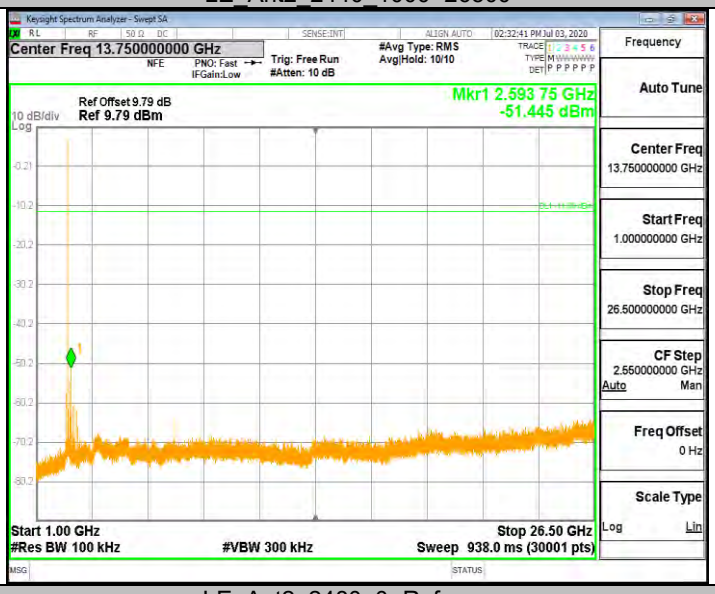
LE_Ant2_2440_1000~26500



LE_Ant2_2480_0~Reference

LE_Ant2_2480_30~1000

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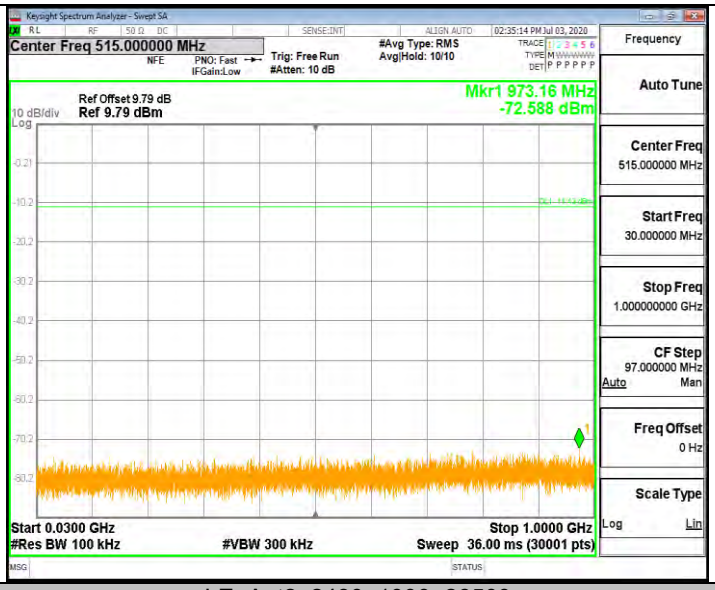
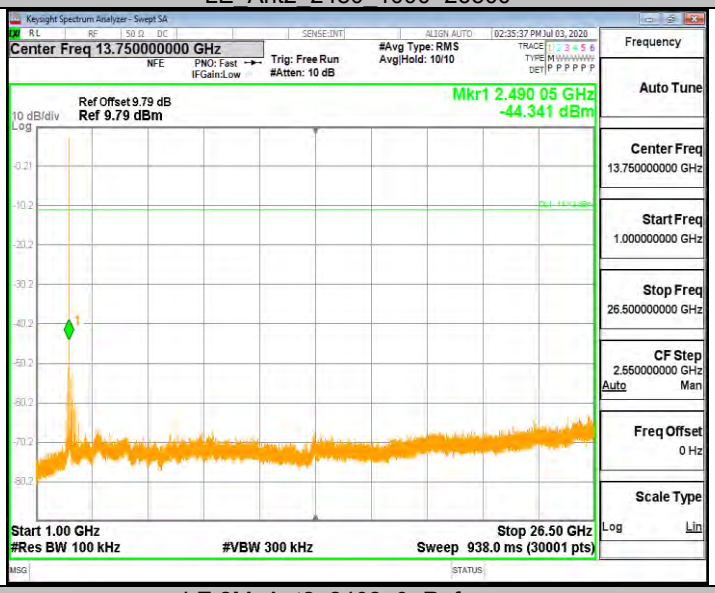
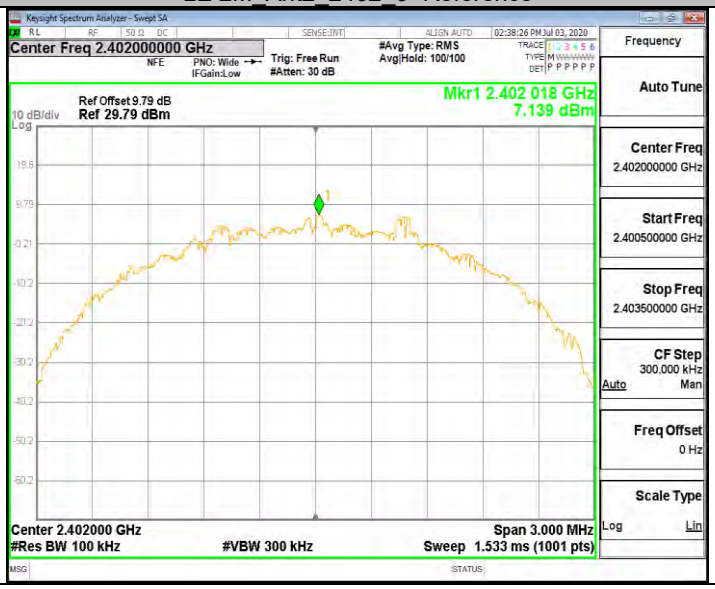


LE_Ant2_2480_1000~26500



LE 2M_Ant2_2402_0~Reference



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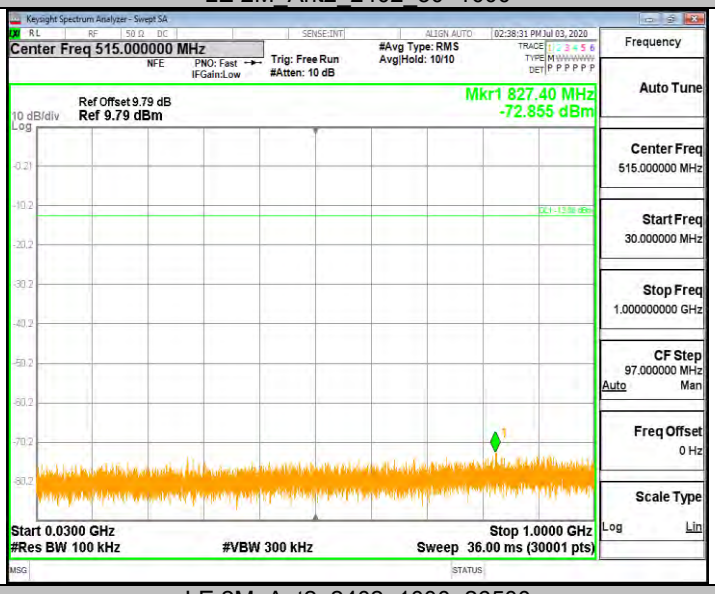
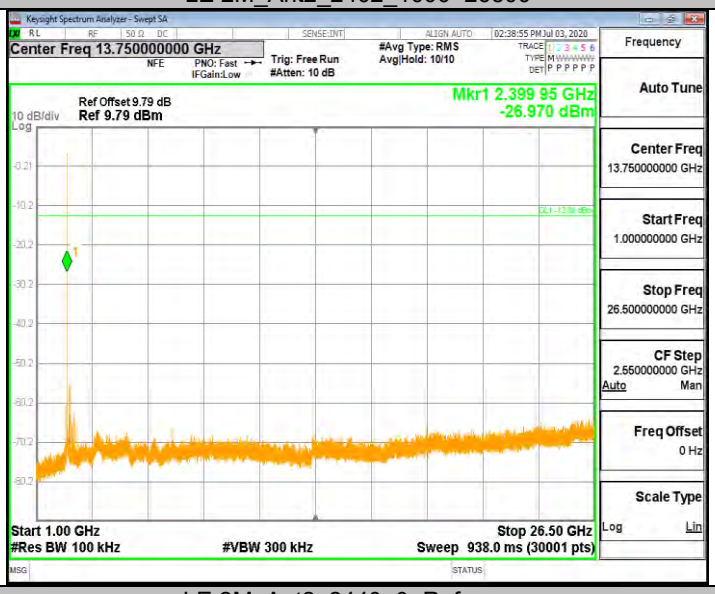
LE 2M_Ant2_2402_30~1000



LE 2M_Ant2_2402_1000~26500



LE 2M_Ant2_2440_0~Reference

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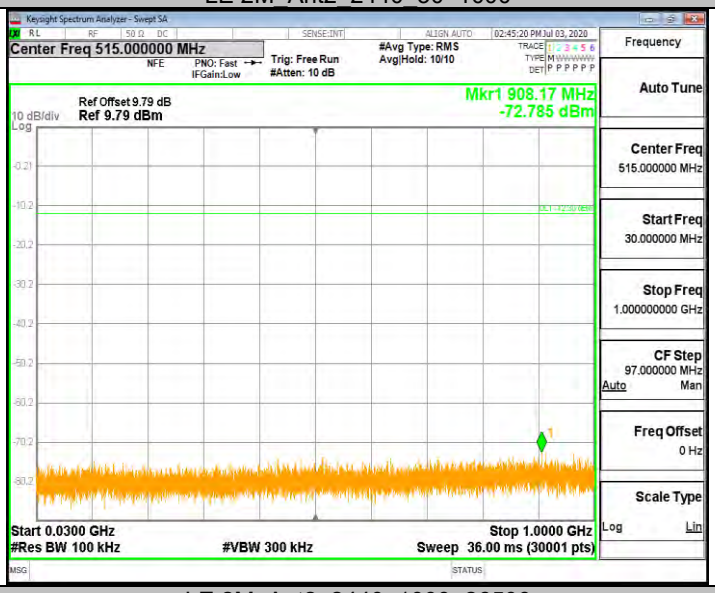
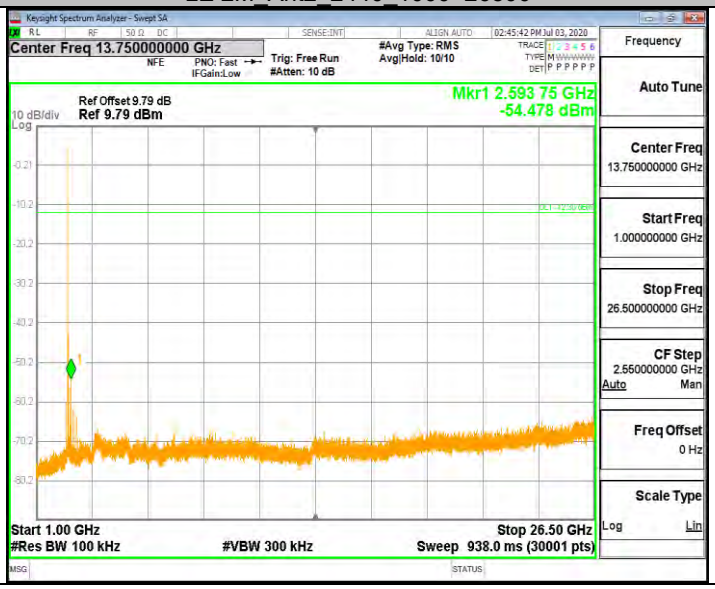
LE 2M_Ant2_2440_30~1000



LE 2M_Ant2_2440_1000~26500



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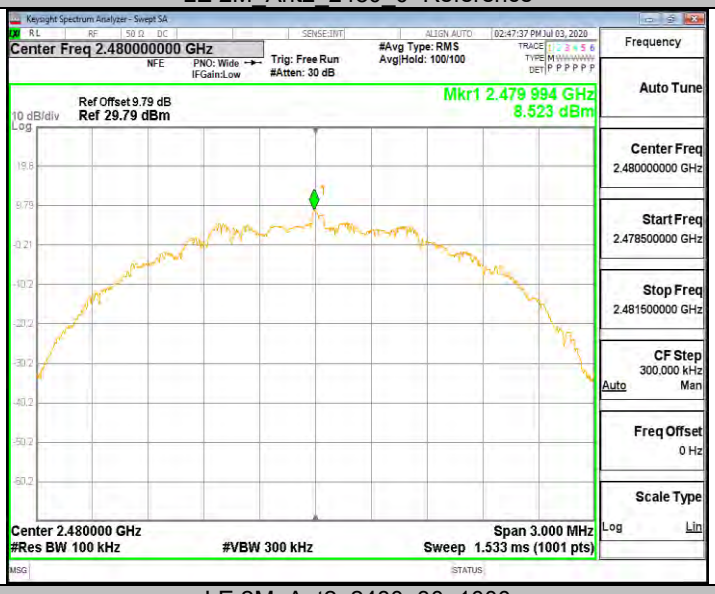
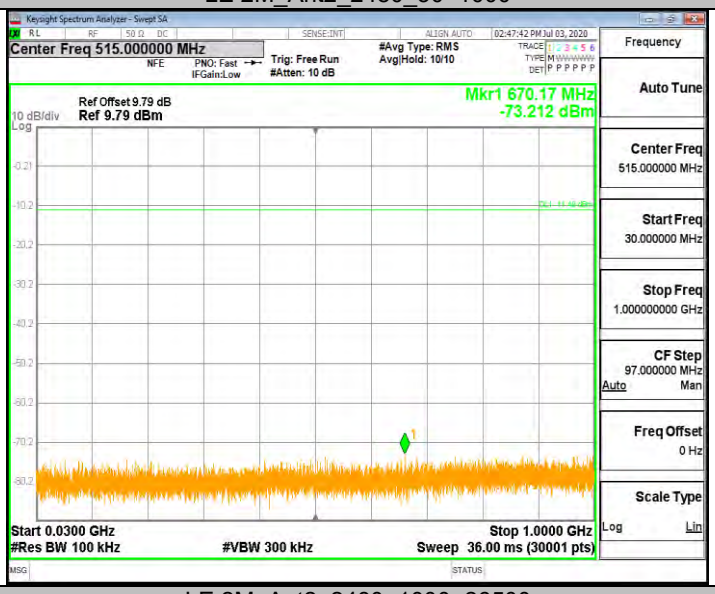
LE 2M_Ant2_2480_0~Reference



LE 2M_Ant2_2480_30~1000



LE 2M_Ant2_2480_1000~26500

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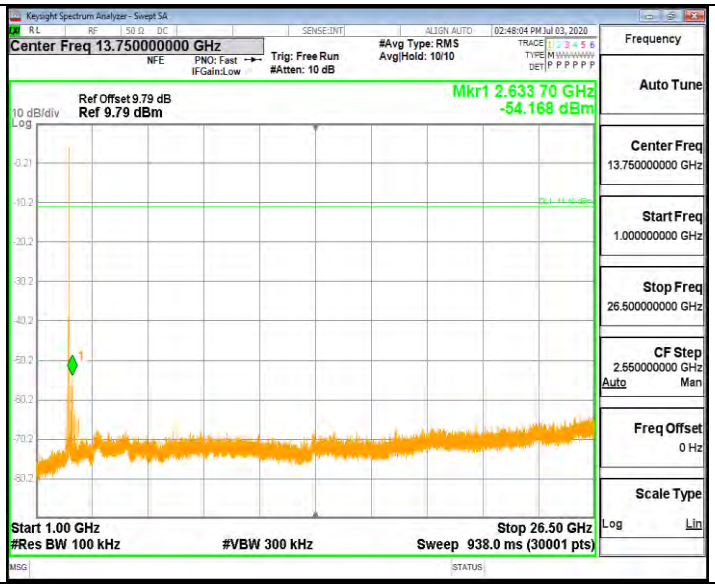

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Appendix G: Duty Cycle

Test Result

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
LE	2.14	2.50	0.856	85.6 %	0.66	0.47	0.5
LE 2M	1.08	1.86	0.581	58.1 %	2.36	0.93	1

Note:
Duty Cycle Correction Factor=10log(1/x).
Where: x is Duty Cycle (Linear)
Where: T is On Time (transmit duration)
If that calculated VBW is not available on the analyzer then the next higher value should be used.

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Test Graphs

LE_Ant2_2440

LE 2M_Ant2_2440

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